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Has Swedish Monetary Policy been Countercyclical?

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1. INTRODUCTION AND SUMMARY.

Outside financial markets, there has traditionally been little interest in monetary policy in Sweden. The money supply and the interest rate have played a minor role in analysis and forecasts of Swedish business cycles. Yet, the money supply was in some periods closely correlated with output and prices, and one interpretation of such correlations is that money plays an important role in generating fluctuations in output and prices – monetary policy may be more important than is generally perceived.

The purpose of this paper is to *describe* Swedish monetary and credit policy 1960–1990 in broad terms. We will *not* try to measure the effects of monetary policy or examine the validity of alternative macroeconomic theories. Instead, the focus is on the following questions: What are the stylised facts with respect to monetary policy? When was monetary policy expansive (contractive)? Has monetary policy been pro– or countercyclical? Did monetary policy affect the availability of credit? What instruments were used in monetary policy?

During most of the post–war period, credit market regulations were a characteristic feature of Swedish monetary policy. Since most regulations were abolished in the 1980s, one may argue that experience prior to the deregulation is irrelevant for understanding current developments.[1] On the other hand, we cannot know whether previous experience is relevant until we have analysed it. In fact, changes in regulations create large variation in the data, which may allow us to answer questions which cannot be answered with data for more stable periods.

The method of analysis is "eye–econometrics": graphs of the series are examined and we try to extract stylised facts. Possible interpretations of the data

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[1] For a brief review of the deregulation in Sweden, see Englund (1990).

are discussed, but we abstain from formal econometric analysis.

What variables should one look at in order to describe monetary policy? This question is discussed in *section 2*. We argue that an ideal indicator of monetary policy should be *controllable*: the monetary authority should be able to control it with reasonable precision if it wanted. An indicator should also be *related to the effect* of monetary policy on aggregate demand. Since we do not try to distinguish active and passive policy, a variable may be a useful indicator of monetary policy even if the monetary authority did not actively try to control it.

In order to classify monetary policy as "expansive" or "contractive", one must also specify a *reference path* with which one compares the actual policy. If we look at the interest rate, we use a different implicit reference path, compared to when we look at money supply or bank credit. We argue that, in general, there is no unique correct indicator of monetary policy, but we should look at several variables in order to examine how monetary policy was conducted. If we find, for example, that the money supply is countercyclical, we may say that monetary policy is countercyclical (stabilising) relative to a policy of constant money growth. If we find that the interest rate is procyclical, monetary policy is countercyclical relative to a constant–interest–rate policy. Clearly, such statements are conditional on maintained hypotheses concerning how the economy works, including the lags with which monetary policy affects aggregate demand.

The openness of the Swedish economy limits the Riksbank's ability to control the interest rate and the money supply. In theory, if there are no capital controls, and the exchange rate is fixed with certainty, there cannot be any independent monetary policy – beyond the maintenance of the fixed exchange rate. In practice, these conditions were not fulfilled during this period, so there was probably some scope for an independent monetary policy.

In *section 3* we try to evaluate the scope for an independent monetary policy in this period. The substantial deviations from covered interest parity (CIP) in the

1970s suggest that capital controls effectively constrained capital *outflows* in this period. The deviations from CIP are small after 1981. Apparently, capital was sufficiently mobile to arbitrage away deviations from CIP, but capital contols still limited the number of agents who could take positions in foreign exchange.

When we compare the nominal interest rate in Sweden to foreign rates, we find some periods when the interest rate differential cannot be explained by reasonable exchange rate expectations. Apparently, other things than exchange rate expectations affected the interest rate differential, suggesting that the Riksbank may have been able to control the interest rate and the money supply.

In *section 4* we examine the cyclical pattern of various indicators of monetary policy. We look at real and nominal interest rates, money supply and bank loans. The nominal interest rate tends to increase in booms, but since inflation also increases in booms, the real interest rate has no clear cyclical pattern. There are large variations in the growth rates for money and bank loans. Money supply appears to be countercyclical in the 1960s and 1980s, and procyclical in the 1970s. The picture for bank loans is less clear. In the 1960s, both nominal and real bank loans lead the cycle. In the 1970s, nominal bank loans have no clear cyclical pattern, but real bank loans are strongly procyclical. The 1980s are dominated by the effect of the deregulation.

Was monetary policy countercyclical? The answer depends on the lags with which monetary policy affects aggregate demand. Since the nominal interest rate increased in booms, one may argue that monetary policy was countercyclical compared to a constant nominal interest rate. But increases in the interest rate often ocurred at the very peak of the cycle, so if the effects occurred with a lag, interest rate increases may have contributed to the downturns rather than stabilised the expansions.

Compared to constant (nominal or real) money growth, monetary policy was countercyclical (stabilising) in the 1960s and 1980s, and procyclical (destabilising)

in the 1970s – provided that the lags are not too long. For bank loans, the picture is less clear, and depends on whether we look at real or nominal bank loans. For the period as a whole, monetary policy does not appear very countercyclical by any of the quantitative indicators.

In *section 5* we study wider measures of credit supply, including credit from housing credit institutions, finance companies, insurance companies etc. Credit from other intermediaries than banks is quantitatively as important as bank loans. Credit supply from housing credit institutions developed more smoothly than bank credit. Finance companies became quantitatively important in the late 1970s. Total real direct credit from intermediaries is procyclical, especially in the 1970s.

In *section 6* we examine how various instruments were used by the Riksbank. We focus on the regulated period, which constitutes the major part of the period. Cash reserve ratios were not used for the purpose of monetary control. Sales of government bonds and treasury bills from the National Debt Office appear to have been passive, pegging the interest rate.

Secondary reserve requirements ("liquidity ratios") were binding during a substantial part of the period, and the Riksbank directly controlled issues of housing bonds, as well as holdings of housing and government bond outside the banking system. We show that in this situation, liquidity ratios could be used for both allocation and stabilisation purposes. If an increase in the liquidity ratio was combined with a permission to issue housing bonds, the effect was to reallocate credit. If an increase in the liquidity ratio was not accompanied by new issues of housing bonds, banks would buy bonds from the National Debt Office, leading to a reduction of credit and deposits. Thus, the liquidity ratio could be used to control bank loans and the money supply. In practice, however, the liquidity ratio was not used systematically to pursue countercyclical monetary policy.

2. WHAT ARE USEFUL INDICATORS OF MONETARY POLICY?

2.1. Requirements.

Monetary authorities take a lot of different actions – or choose not to take action. What variables should one look at in order to describe monetary policy? What are meaningful indicators of monetary policy?

We suggest two requirements, that an indicator variable should ideally fulfill. First, it should be *controllable:* the monetary authority should be able to control it with reasonable precision, if it so desires. This requires that the monetary authority has accurate information about the variable and posesses sufficiently powerful instruments to control it. Any description of monetary policy must rely on maintained hypotheses concerning what variables the central bank can control.

Second, an indicator of monetary policy should be *related to the effect* of monetary policy. We will mainly be concerned with the role of monetary policy in stabilising aggregate demand.[2] Thus, an indicator should have the property that a change in the indicator is, ceteris paribus, associated with a change in aggregate demand in a particular direction.

Once one has decided what indicators to look at, one also has to decide what changes in these variables should be characterised as "expansionary" or "contractionary". This requires that a *reference path* is specified for monetary policy.

Which variables that are suitable as indicators of monetary policy clearly depends on what analytical model one has in mind. In the rest of this section we will discuss the choice of indicators in particular simple models.

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[2] Other objectives of monetary policy will be discussed below.

2.2. Indicators of Monetary Policy in the IS–LM Model.

Consider a textbook IS–LM model for a closed economy, with fixed prices:

$$(1) \quad y_t = \alpha_0 + \alpha_1 y_t - \alpha_2 i_t + d_t ,$$

$$(2) \quad m_t = \alpha_3 + \alpha_4 y_t - \alpha_5 i_t - v_t ,$$

y_t is output (income), i_t is the interest rate, and m_t is money supply. The first equation says that output equals aggregate demand, which depends on income and the interest rate. Other factors that affect aggregate demand are included in the demand shock d_t. The second equation says that money supply equals money demand, which depends on output and the interest rate. Other factors that affect money demand are included in the velocity shock, v_t. Assume that both the money supply and the interest rate are controllable, as defined above. (Of course, the central bank cannot set these variables independently, but we assume that either the money supply or the interest rate could potentially be controlled.)

What is a good indicator of monetary policy in this model? To ask whether the central bank "really" controls the interest rate or the money supply is not meaningful when both variables are controllable. It is like asking whether a monopolist "really" controls the price or the quantity! If the board of the central bank takes decisions about interest rates, it also, implicitly, takes decisions about the money supply.

Ceteris paribus, an increase in the money supply is associated with a decrease in the interest rate and conversely. If the economy was *not* subject to shocks ($d_t = v_t = 0$), there would be a one–to–one relation between changes in the money supply and the interest rate. Then, it does not matter whether we use the money supply or the interest rate as indicator of monetary policy – the characterisation of monetary policy will be the same independently of which

variable we use.

When the economy is subject to shocks the choice of indicator matters. The above argument can be generalised, however. *For a known sequence of the shocks*, one could specify a reference path for the money supply and a corresponding reference path for the interest rate, so that the two paths were consistent with each other. Relative to that reference path, an increase in the money supply in one period would be associated with a decrease in the interest rate, so the characterisation of monetary policy would be the same whether money or the interest rate was used as indicator.

In practice, we (economists) do not observe all the shocks and we have very imperfect knowledge concerning the parameters. The standard practice in accounts of monetary policy is to compare with historical values of the variables. An acceleration of monetary growth is often said to be expansionary, and an increase in the nominal interest rate is often said to be contractionary. But sometimes, the characterisation of monetary policy differs depending on which variable one looks at.

That this can happen is easy to understand. Suppose, for example, that money demand falls due to a financial innovation ($\Delta v_t > 0$). Suppose that the central bank reduces the money supply, but not sufficiently to prevent a fall in the interest rate and an increase in output. In this case, monetary policy is contractive, stabilising output, compared to a constant money supply, but expansive, destabilising output, compared to a constant interest rate.

The same argument can be made if one looks at correlations over longer periods. Suppose that velocity shocks are important relative to shocks to aggregate demand, and that the correlation of money supply with the velocity shock is negative, but not sufficiently large to stabilise output. Then, velocity shocks reduce interest rates and increase output, and monetary policy is stabilising relative to a constant money supply rule, but not relative to a constant interest

rate rule.[3]

Suppose, instead, that there is a positive shock to aggregate demand. The central bank lets the money supply increase, but not by enough to prevent an increase in the interest rate. Compared to a constant money supply, monetary policy is accommodating, but compared to a constant interest rate, monetary policy is stabilising the shock. Again the same argument can be made with respect to covariances over longer periods.

The reason for the ambiguity is clear: in one case, constant money supply is used as the reference path, in the other, constant interest rate. *Since the economy is subject to shocks, these reference paths are not the same.* Neither reference path can be said to be the "correct" one. In fact, both comparisons can tell us something about the stabilising role of monetary policy. If we find, for example, that the money supply is countercyclical, we can conclude that monetary policy is stabilising relative to a policy that holds the money supply constant. If we find that the interest rate is procyclical, we can conclude that monetary policy is stabilising relative to a constant–interest–rate policy.[4]

Constant money supply (or money growth) or constant interest rate are not the only reference paths we could choose. One could use a long–run trend as the reference path. Another alternative would be to compare actual policy to the *optimal* policy, but this would require a quantitative macroeconomic model, an objective function for the central bank, and knowledge of the information available

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[3] Money supply is a less useful indicator of monetary policy if velocity shocks are large. A closely related statement is that the *optimal* policy rule will rely more on interest rates if velocity shocks are large. For an extensive discussion of alternative policy rules, see McCallum (1985, 1989).

[4] These conclusions hold in a static IS–LM model. A more plausible model would take account of expectations, lags, persistent effects of shocks etc.

to central bank when it took its policy decisions. Such an analysis is beyond the scope of the present paper.

We conclude that there is not a unique useful measure of monetary policy or a unique useful definition of "expansionary" and "contractionary". We should look at both money and interest rates in order to describe monetary policy. Both indicators can tell us something about how monetary policy was conducted – relative to how it could have been conducted. In this sense, the money supply and the interest rate are both useful indicators of monetary policy – provided that they are controllable.

The model in equations (1) and (2) was used to illustrate some arguments, but it is too simple to serve as a basis for an empirical investigation. Below we discuss (informally) the complications that arise in more realistic models. This discussion will be the basis for our choice of – and interpretation of – various indicators of monetary policy.

2.3. Definition of Money.

The conclusion that the money supply may be a useful indicator of monetary policy in the IS–LM model relies on several assumptions: the money supply is controllable, there is a stable money demand function relating money demand to activity and the interest rate, and the interest rate affects aggregate demand. If these conditions are fulfilled the central bank can influence activity in a desired direction by changing the money supply.

When there are several different money–like assets, the same argument can be applied: *a monetary aggregate is useful as an indicator of monetary policy, provided that it is controllable and that there exists a stable demand function for it, with activity and interest rates as arguments.*

The demand for *currency* is likely to be a stable function of economic activity, but the quantity of currency is unlikely to be controllable. In our

financial system, banks are free to exchange reserves for currency whenever they wish. Suppose that the demand for currency depends on activity only. Then the central bank can control currency only by controlling activity. If currency demand is interest elastic, but the elasticity is small, the quantity of currency may be controllable, but only at the cost of very high interest volatility. For practical purposes, it may be regarded as uncontrollable.

What about the *monetary base*, defined as currency plus bank reserves? Bank loans are a sluggish variable, so if banks' demand for reserves is inelastic with respect to the interest rate, short–run control of the monetary base will also require very large interest rate volatility. In practice, the monetary base may be hard to control in the short run, but controllable over a longer period as bank loans and deposits adjust. The monetary base is only very indirectly related to economic activity, however.

In a textbook model, the quantity of money – defined as *currency plus deposits* – is a very useful indicator of monetary policy, since it summarises the effects of market operations, cash reserve requirements, and changes in the terms for discount window borrowing. Whether the quantity of money is controllable depends on the central bank's ability to forecast and counteract changes in private currency holdings, reserves etc. In the empirical analysis below, we will use currency plus deposits as one indicator of monetary policy.

2.4. Real or Nominal?

Should one can look at real or nominal interest rates, and real or nominal money supply? Again, we apply the same principle: a variable is a useful indicator of monetary policy if it is controllable and related to the effect of monetary policy. Spending decisions should depend on the expected real interest rate, but the nominal interest rate may be more directly controllable, and the expected inflation is not observed. In section 4, we will use both real and nominal variables as

indicators of monetary policy.

2.5. Availability of Credit.

The textbook analysis of banks and the money supply process does not take account of banks in their role as *financial intermediaries*, spreading risks and evaluating and monitoring borrowers. This role is important, since information problems make it hard for some borrowers to obtain credit through other channels than banks. Since banks are subject to reserve requirements, monetary policy affects the supply of bank credit in two ways. First, an expansion of bank credit absorbes reserves, and monetary policy affects the quantity of bank credit through this channel. Second, when no interest is paid on required reserves, reserve requirements have a direct effect on the wedge between deposit and lending rates.

During most of the period studied here, bank lending rates were regulated by the Riksbank and there was rationing in the market for bank loans. Thus, the interest rate did not measure the shadow price of funds, and there is reason to examine the total *quantity of bank loans* as one indicator of monetary policy.[5] Formally, one could replace the model in equations (1) and (2) by the model

$$(3) \qquad y_t = \beta_0 + \beta_1 y_t + \beta_2 \Delta L + d_t$$

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[5] Even if the interest rate is not regulated, imperfections in the credit market may imply credit rationing, so that the interest rate is an imperfect meassure of the shadow price of funds. That the effects of monetary policy go through the *availability* of credit, rather than interest rates, is an old idea that has regained popularity recently. For a survey of the availability literature in the 1950's, see Lindbeck (1963), and for more recent surveys of the literature on banks and credit availability, see Santomero (1984) and Gertler (1988).

(4) $R_t = \beta_3 + \beta_4 y_t + k_t D_t - v_t$

(5) $L = (1-k_t) D.$

Equation (3) says that output equals agregate demand, which depends on income, the change in bank credit (L), and a demand shock. Equation (4) equates supply of monetary base, R_t, to demand, which depends on transactions (income) and required reserves, $D_t k_t$, where D_t is deposits, and k_t is the cash reserve ratio. Equation (5) says that banks lend all the funds that are not held as required reserves. (The interest rate on bank loans is assumed to be regulated at such a level that there is excess demand for bank loans.) In this model, monetary policy affects activity through its effect on the quantity of bank loans, rather than through interest rates.

One may argue that it is the *total availability of credit* – rather than the quantity of bank loans – that matters for aggregate demand. There are other intermediaries in the credit market beside banks, and large firms may issue bonds or borrow from foreign banks. We return to this question in section 5 , where we examine wider measures of credit supply.

2.6. Monetary Policy in the Open Economy.

A fixed exchange rate means that interventions in the foreign exchange market are used to control the exchange rate. We will say that a country has *monetary autonomy,* if the other instruments of the central bank (open market operations etc.) can be used to control the interest rate and the money supply.[6]

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[6] See Hörngren (1986), Vredin (1988), Frankel (1989) for further analyses and reviews concerning capital mobility, monetary autonomy, covered and uncovered interest parity etc.

Consider an open economy version of the model in equations (1)–(2), with three assets: domestic money and domestic and foreign short–term bonds. If there are no obstacles to capital movements, markets are well functioning, and the exchange rate is fixed with certainty, the interest rate must be the same as abroad. We add one equation to the model in (1)–(2):

$$(6) \qquad i = i^* ,$$

where i^* is the foreign interest rate. Now, neither money supply, nor the interest rate are controllable. An attempt to increase the money supply by purchasing bonds will only lead to a capital outflow. Of course, it is meaningless to use money supply or interest rates as indicators of monetary policy in this situation.

In practice, there is always some uncertainty about the exchange rate, so that (uncovered) interest rate arbitrage is not risk–free.[7] In this situation, the degree of monetary autonomy depends on investors' attitude to risk and on the degree of uncertainty about the exchange rate. If investors are risk neutral, the interest rate differential reflects only exchange rate expectations, *uncovered interest parity* holds:

$$(7) \qquad i = i^* + \hat{e}^e ,$$

where $\hat{e}^e$ is the expected percent change in the value of the foreign currency. In this case, monetary policy affects the interest rate only to the extent that it affects the expected exchange rate.

Investors do not appear to be risk neutral, however, and the capital

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[7] Here and below, when the word uncertainty is used, it refers to the perceived *variance* of the exchange rate, rather than the expected change.

available for speculation is limited. If the Riksbank sells bonds, there will be a capital inflow, but since investors require a higher Swedish interest rate to hold more bonds denominated in kronor, the Swedish interest rate increases as a result of the market operation.

Since the exchange rate was uncertain during large parts of the period, and since capital controls limited interest rate speculation, the Riksbank probably was able to influence the interest rate to some extent. The question is *to what extent* the Riksbank could control the interest rate and the money supply.[8]

A related question is how the government's choice between domestic and foreign borrowing affects interest rates. Suppose that there are no capital controls, but there is uncertainty about the exchange rate, investors are risk averse, and the central bank decides to set an interest rate below the international rate. If the government does not borrow abroad, the central bank may begin to run out of foreign exchange reserves, and the policy may have to be reversed. If the government borrows abroad, exchange reserves can be maintained. Government borrowing in foreign currencies is a way of "filling up" the foreign currency reserves, which allows a low–interest rate policy to be carried further than if this is not allowed.

Another question is how the openness of the economy affects the Riksbank's ability to control *bank credit*? Consider an economy with a completely fixed exchange rate and no capital controls. Suppose that agents can freely switch their deposits between countries, but Swedish firms cannot borrow abroad because of information problems. In this situation, the deposit rate must be the same as abroad, and market operations will not affect interest rates, deposits, or bank credit. However, when zero interest is paid on required reserves, an increase in the

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[8] See Svensson (1991) for an argument that the risk premium – and thus the monetary autonomy as defined above – is likely to be small.

cash reserve requirement will raise the bank lending rate for a given deposit rate, so the central bank may still be able to influence the price and quantity of bank credit.[9] Secondary reserve requirements may also be effective, since they reduce bank credit for a given level of deposits. The Swedish experience after the deregulation, which will be discussed below, supports the view that secondary reserve requirements (and loan ceilings) did affect the availability of credit.

2.7. Other Goals of Monetary Policy.

Although we focus on output stabilisation, this is certainly not the only conceivable goal of monetary policy. Indeed, it is often argued that long–run *price stabilisation* should be the primary goal of monetary policy, and that maintenance of a *fixed exchange rate* is the primary way to achieve this goal. We still think that it is interesting to study whether monetary policy was countercyclical relative to output. First, output stabilisation was one goal of monetary policy in this period. Second, discussions concerning what should or should not be a goal of monetary policy need to be based on experience. Whether monetary policy succeded in stabilizing output in the past may affect our view of whether one should try to stabilize output in the future.

2.8. Delimitations.

It should be clear from the discussion above that our purpose is to *describe* monetary policy. We will *not* try to measure the *effects* of monetary policy, but our analysis relies on maintained hypotheses concerning the direction of the effects, e. g. that an increase in the money supply is expansionary, ceteris paribus.

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[9] Since banks can differentiate deposit rates, the incidence of cash reserve requirements may also fall on small depositors who have little access to the international capital market.

Our characterisation of monetary policy is independent of what the policy–makers were thinking, and what they were trying to achive. We do *not* claim that the Riksbank was actually trying to control the variables that we use as indicators of monetary policy. No distinction is made above between *active and passive* policy. Suppose, for example, that the money supply is controllable. Then, if the money supply increases because of a currency inflow, the central bank could have prevented the increase in the money supply. If the central bank did allow money supply to increase, we regard this as policy.

Also, no claims are made that our indicators of policy are *exogenous.* Exogeneity means different things in theoretical analysis and structural econometric modelling. In a *theoretical* analysis, one can always make a thought experiment, holding either the money supply or the interest rate constant (exogenous), provided that such a policy is feasible within the model. This can be done independently of how policy was actually conducted in a historical period.

To *econometrically estimate* behavioural equations, e. g. a money demand function, one must make assumptions about actual policy in order to achieve identification. Serious simultaneity problems arise, since policy makers respond to what happens, just like firms and households. It is hard to find variables that are likely to be exogenous in this sense. This problem does not arise in the present paper since we do not estimate behavioral relations.

3. COULD THE RIKSBANK CONTROL THE INTEREST RATE ?

Before we go on to describe monetary policy we will try to evaluate the scope for an independent monetary policy by comparing Swedish interest rates to interest rates abroad. We will argue that the Riksbank was able to influence the Swedish interest rate and the supply of money and bank credit, so that it is meaningful to

use these variables as indicators of monetary policy.

3.1. Exchange Rate System and Capital Controls.

The exchange rate against the dollar and the D–mark is plotted in *figure 3:1.* The krona had a fixed rate against the dollar in the *Bretton Woods system* until August 1971, when the dollar started to float against other currencies. After a period of managed float, new fixed exchange rates were established in December 1971, where the krona had appreciated 7.5 percent against the dollar and depreciated 5.3 percent against the D–mark compared to earlier parity values. In February 1973, the dollar was devalued 10 percent, and the krona followed the dollar half way. In March 1973, Sweden joined the *"European snake"*, which started to float against the dollar.

The snake set a maximum deviation between the strongest and the weakest currency in the group. Since this put a limit on the deviation between the krona and the mark, one may say that we had a fixed exchange rate against the D–mark.[10] However, the interval within which currencies could vary was rather large,[11] there were frequent realignments, and countries continuously joined and left the snake; this exchange rate system must have been considered much less certain than the Bretton Woods system had been in the 1960s. The krona was devalued relative to the German mark in October 1976 (3 %), and in April 1977 (6 %).

In August 1977, the krona was devalued by a further 10 %, and tied to a

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[10] One may equally well say that we had a fixed exchange rate against some other currency which participated in the European snake. When we compare interest rates below, we will compare to the interest rate on D–marks for this period.

[11] The maximum deviation from bilateral parities was 2.25 %. Thus, two currencies could change by a maximum of 4.5 % relative to each other. The maximum deviation from parity had been .75 % in the Bretton Woods system.

weighted average of 15 currencies, the *"basket"*. Initially, only the target value of the krona was announced, but in June 1985, the Riksbank announced the band, within which the krona was allowed to vary. After the devaluations in 1977, there was again a loss of competitiveness, and eventually two devaluations in September 1981 (10 %), and October 1982 (16 %).

Capital controls were very restrictive in the 1960s.[12] Essentially there was a ban on outgoing portfolio investments, as well as on foreign borrowing for domestic use. This restrictive control remained, with minor changes, until 1974. However, firms were allowed to finance exports and imports with commercial loans from foreign banks, provided that the conditions of the loans were closely tied to the payments for goods. Also, exporters and importers could adjust trade credits in order to postpone or speed up payments. Estimates suggest that such changes in trade credits can lead to substantial inflows and outflows (Sellin (1980), SOU 1980:51, supplement 1.3, SOU 1985:52, page 214).

A major change in the capital controls occurred in June 1974 when, as a result of increasing current account deficits, the Riksbank started to encourage foreign borrowing. Firms were allowed to borrow abroad, provided that the loans had a minimum maturity of five years.

Another important change occured in 1979, when Swedish authorized exchange banks were given a general permission to borrow abroad to finance exports and imports. Thus, the individual importer or exporter no longer had to ask for permission. Various restrictions were supposed to assure that these credits were tied to the underlying trade credits, but these restrictions were not very effective, so the flexibility of short–term commercial credit increased (SOU 1985:52, page 218). Also in 1979, a more liberal practice was established with

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[12] For more detailed reviews of how exchange controls were applied, see SOU 1980:51 and SOU 1985:52.

respect to sales of Swedish shares abroad, something that became important in the 1980s. From October 1981, banks were allowed to pay interest on foreign currency accounts. The minimum maturity for loans from abroad was reduced to two years in February 1984, and to one year in December 1986. There were several minor liberalisations of the exchange controls in the 1980s, and in June 1989, all remaining exchange controls were abolished.

3.2. Definitions of Interest rates.

When we compare domestic and foreign interest rates, we will take the perspective of a business firm, making a short–term financial investment. Thus we look at the *short term (deposit) rate relevant for business.*

In the 1960s, the money market was not well developed in Sweden, and firms would normally hold their excess liquidity in a deposit account in their bank. Beginning around 1970, unregulated finance companies started to compete with banks, large companies developed their financial departments, and the traditional attachment to one bank was weakened (SOU 1982:53, pages 210–211). Banks started to offer so called "special deposits" around 1967. These are deposits in large amounts, which are tied for short periods, and where the interest rate is negotiated between the depositor and the bank. The volume of special deposits increased rapidly in the 1970s.

In 1980, banks started to issue certificates of deposits, which differ from special deposits in that a secondary market exists. In other respects, they are very similar to special deposits. Treasury discount notes (statsskuldväxlar), which were introduced in 1982, are similar (for the investor) to certificates of deposits, but they have a better functioning secondary market.

Our measure of the short term interest rate is the deposit rate until 1967, the special deposit rate 1968–1982, the rate on three month certificates of deposits 1983:1–1983:2, and the rate on three month treasury discount notes

(statsskuldväxlar) thereafter. Special deposits became available around 1967, but interest rates on special deposits are not available before 1968. The difference between the rates on special deposits and ordinary deposits was 1.6 percent in the first quarter of 1968. The rates on special deposits, certificates of deposits and treasury discount notes are almost identical.

For *foreign interest rates* we use three month Euro–market rates, where available. All interest rates are at the end of the quarter. The *realised real interest rate* is calculated using the *actual* rate of change of consumer prices (in the relevant country) over three months from the month when the interest rate was quoted. While consumption and investment decisions depend on the *expected* real interest rate, we do not want to commit to any particular theory of inflationary expectations. Instead, we focus on the realised real interest rate, leaving the reader to speculate about whether inflation was foreseen on particular occasions. Further information about the data can be found in the appendix.

3.3. Deviations from Covered Interest Parity

Covered interest parity (CIP) says that the forward premium on foreign exchange equals the interest rate differential. If CIP does *not* hold, there is a possibility to make a risk–free profit for someone who can move money from deposits in one currency to deposits in another. We are interested in whether CIP holds since *deviations from CIP suggest that capital controls are effective*, implying some degree of monetary autonomy.

The expected exchange rate is an important determinant of the forward rate, but *we will not use the forward rate as a measure of the expected exchange rate.* Only if capital is perfectly mobile and investors are risk–neutral, does the forward rate measure the expected exchange rate. As discussed in section 2, these conditions were not fulfilled during this period.

Figure 3:2 shows the deviations from CIP for the three month horizon from

1968. (The forward market was very small in the 1960s.) There were substantial deviations from CIP during the period 1973–81. The negative sign means that it was possible to make a risk–free profit for someone who could take money from a special deposit account in Sweden, deposit it in a Eurodollar account and sell dollars forward. Since these deviations from CIP were not arbitraged away, capital controls must have been an effective constraint on *outflows.*

Figure 3:3 shows that the large deviations from CIP in 1974, 1976, 1977 and 1981 arise in connection with an increase in the forward premium, rather than a change in interest rates. The deviation from CIP in 1974 occured when the registered current account turned rapidly from surplus to deficit, and inflation accelerated. The spikes in 1976 and 1977 occured before devaluations. In January 1981, there was uncertainty about the exchange rate, and eventually a devaluation in September (SOU 1985:2, page 220). On all occasions, large deviations from CIP were followed by either an increase in the Swedish interest rate relative to foreign rates or a devaluation.

A natural interpretation is that the Swedish interest rate was out of line with exchange rate expectations on those occasions, so that the demand for forward dollars increased. Capital controls and limits on banks' positions prevented financial intermediaries from meeting this demand without bearing the exchange rate risk themselves. As a result, the forward rate increased more (for given interest rates) than it would have done without capital controls.[13]

The deviations from CIP are much smaller in the 1980s. Most of the deviations after 1981 can be motivated by transaction costs and differences in the

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[13] Deviations from CIP help to explain capital flows in Sweden 1970–1982 – see Gottfries–Persson–Palmer (1989) and SOU 1982:52, page 78. Similar deviations from CIP have been observed shortly before devaluations in France and Italy, when these countries had substantial capital controls – see references in Frankel (1989).

character of the assets (see Englund, McPhee and Viotti (1985)). Aparently, short–term capital was *sufficiently* mobile to eliminate arbitrage possibilities connected with deviations from CIP. Put differently, the demand for forward currency could be satisfied without deviations from CIP.

The deviations from CIP before 1982 are an indication that capital controls were effective and that Sweden had some monetary autonomy: if investors cannot fully utilise risk free arbitrage possibilities, the same must apply to risky (uncovered) arbitrage. The converse is not true: if CIP *does* hold, we cannot infer that capital controls are ineffective or that there is no monetary autonomy. If the forward market had been unregulated, this would have meant that capital controls were ineffective for short–term capital. But the regulations allowed only forward contracts which were associated with particular transactions (trade payments etc.), so many agents did not have access to the forward market. This limited the number of agents who could take open positions in the foreign exchange market, and increased the degree of monetary autonomy, provided that agents are risk–averse.[14]

3.4. Deviations from Uncovered Interest Parity.

Another indication of the degree of monetary autonomy – and thus of the controllability of interest rates and money supply – is whether *uncovered interest parity* (UIP) holds. UIP says that the interest rate differential equals the expected change in the exchange rate (see equation (7)). If UIP does *not* hold, the most

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[14] A forward contract for dollars is *equivalent* to a loan in kronor, which is deposited in Euro–dollars. Therefore, the forward market plays no fundamental economic role, although it simplifies transactions. We will therefore disregard the forward market in the discussion of monetary autonomy below. For further discussion of forward markets in Sweden, see SOU 1985:2, chapter 17 or Franzen (1986).

probable reasons are that investors are risk averse and/or exchange controls are effective. In either case, the Riksbank has some ability to control the interest rate. As an informal test of the UIP hypothesis, let us ask the question: *Can the differential between the Swedish interest rate and the relevant foreign rate be explained by reasonable exchange rate expectations?*

Figure 9:4 shows the Swedish interest rate and the interest rate on the currencies to which the krona was tied. Thus, the foreign rate is the eurodollar rate until the first quarter of 1973, the euro–mark rate until the third quarter of 1977, and a weighted average of basket currencies thereafter. The diagram also shows the interest rate differential and the inflation differential. Note that the Swedish interest rate often lags behind the foreign rate.

Since there were tight capital controls in the 1960s, we would expect substantial monetary autonomy in this period. On the other hand, the exchange rate was more certain in this period than in latter periods, which reduced monetary autonomy. In the data, we see little evidence of monetary autonomy in the 1960s. The interest rate differential relative to the dollar is small. Deviations occur in 1969 and 1971, but they are short–lived, and reflect a general slugishness of the regulated Swedish rate. One interpretation is that Sweden had little monetary autonomy since the fixed exchange rate was highly credible.[15] An alternative interpretation is that the the Riksbank could control the interest rate, but chose a level for the domestic interest rate that happened to coincide with the Eurodollar rate. The coincidence of the interest rates may then reflect a high degree of

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[15] The parity of the krona to gold appears to have been highly credible until 1973, but the dollar started to float in 1971. The only time that Eklöf (1990 a,b) reports some uncertainty about the exchange rate (vs dollar) is a brief period in late 1967, when there was some uncertainty whether Sweden would follow the devaluation of the pound.

syncronisation of the Swedish business cycle with the business cycle abroad.

In the beginning of the "snake" period, there was a negative interest rate differential against the D–mark. This may reflect exchange rate expectations since the Swedish krona was relatively strong after the depreciation and the association with the European currency system. Sweden was lagging behind the international boom, and there were serious suggestions that Sweden should revalue in 1973 (SOU 1985:52, page 210). But it may also reflect the Riksbank's policy. The discount rate was kept constant from the fourth quarter of 1971 to the first quarter of 1974.

In 1974 there was a substantial capital outflow, and the Swedish interest rate was raised to a higher level. During the last three years of the Swedish participation in the European currency snake, there was a positive and growing interest rate difference compared to the D–mark. Since this was the time of the "cost crisis" in Sweden, one can safely assume that much of the differential reflected exchange rate expectations (positive probability of devaluation). In fact, the large swing in the interest rate differential (from minus 4 to plus 4 percentage points!) occured very close to the time when the two year wage agreement 1975–76 was signed. This agreement set wages far in excess of wages abroad, and eventually led to the devaluations in 1976 and 1977. It is noteworthy how closely the change in the interest rate differential corresponds to the change in the inflation differential in 1974–1975.

It is, however, possible that some of the increase of the interest rate differential around 1975 was engineered by the Riksbank. One motive may have been to encourage Swedish enterprises to take up loans abroad, in order to finance the growing current account deficit. Another reason may have been to lower the inflationary pressure in the economy. In fact, there was a large capital inflow in 1975.

When Sweden left the "snake" and devalued, the Swedish interest rate fell about two percentage points below the composite international interest rate. It is

hard to believe that the low interest rate in 1978–79 reflected an expected revaluation. Also, the Swedish interest rate appears low in 1980–81, considering that the (objective) devaluation risk was substantial. The Riksbank appears to have had some autonomy, which it used to keep the Swedish interest rate relatively low in this period.[16]

The devaluations in 1981 and 1982 made Swedish industry very competitive, and the current account improved. There was a deterioration of the current account in 1985, but compared with the early 1980s, the deficit was not very big. Inflation was relatively high in Sweden, but it was decreasing. Thus, the economic situation did not motivate expectations of a devaluation in 1983–85.[17] Yet, there was a substantial positive interest rate differential.[18] Towards the late 1980s, there may again have been expectations of a devaluation, since Swedish inflation remained relatively high.

To sum up, we have found two periods, when we cannot explain the interest differential by reasonable exchange rate expectations. One is the period of relatively low interest rates 1978–1980. Another is the period of high interest rates 1983–1985.

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[16] As we noted above, the deviations from CIP suggest that there was an effective constraint on capital outflows in this period, and money supply was growing rapidly (see section 4).

[17] This view is supported by Edin and Vredin (1991), who estimated a positive model of devaluation. According to their model, the probability of devaluation was slightly positive in 1979, significantly positive in 1980–1982, and zero in 1983–1988.

[18] Lindberg, Svensson and Söderlind (1991) find similar results after correcting for expected movements within the band. They interprete the remaining interest rate differential as devaluation expectations.

These deviations are consistent with the stated policies of the Riksbank and the finance department. As was noted above, the increasing current account deficit was financed by private borrowing in 1974–1976, but from 1977, the government took a major part in foreign borrowing. This policy was continued until 1983. One motivation was to "...avoid a more drastic tightening of credit policy." (Riksbankens förvaltningsberättelse 1979, p. 15). Another motivation was that the state would be able to borrow more cheaply abroad than private firms (Odhner (1986)).

The change in the interest rate differential around 1982–83 may be attributed to a change in policy in the early 1980s. As a result of large government deficits, the secondary reserve requirements ("liquidity ratios") had been raised to a very high level, and it had become clear that they could not be raised much further. Several steps were taken to increase government borrowing outside the banking system (see Riksbankens Förvaltningsberättelse 1981–84). This required market–determined interest rates on government securities. Furthermore, a norm was adopted in 1984 that the government should not take new loans abroad (Odhner (1986)).

3.5. Real Interest Rates.

Another way to look at this evidence is to examine real interest rates. If UIP holds *and* if the expected change in the exchange rate equals the difference between the expected inflation rates, ex ante real interest rates will coincide. These conditions are probably not fulfilled year–by–year, but real interest rates should be correlated over the longer run.

Figure 3:5 shows the Swedish (ex post) real rate and the foreign real rate corresponding to the exchange rate system. We have smoothed the series by taking five quarter moving averages. The correlation between the real rates from 1970

illustrates the limits to our monetary autonomy.[19] In particular, we see that the decrease in the real interest rate around 1972, and the increase around 1981 were international phenomena, which should not be attributed to Swedish monetary policy.

Still, there is a substantial differential between the real rates. With the exception of 1967–68, the Swedish real interest rate was consistently lower than the foreign rate until 1984. The difference varied around two percentage points. Most of the time, it reflects a higher inflation rate in Sweden.

3.6. Uncovered Interest Parity and Rational Expectations.

According to the UIP hypothesis, the interest rate differential is a measure of the expected change in the exchange rate. In *figure 3:6* we have plotted the interest rate differential against the dollar, together with the realized change in the exchange rate. If the UIP hypothesis is correct, the difference between these curves is the forecast error with respect to the exchange rate. If agents have rational expectations, the forecast error should be uncorrelated wih any information known by the investor. In particular, the forecast error should be serially uncorrelated.

There appears to be high serial correlation in the "forecast error". This is particularly true for the currency basket period. From 1978 to 1982, the interest rate differential was primarily negative, but the dollar appreciated. From 1983 to 1987, the interest differential was mostly positive, but the dollar depreciated. A similar calculation can be made for any other currency, or for the currency basket. Formal tests of UIP and rational expectations by Hörngren and Vredin (1989) have

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[19] The large differential between real rates in 1967–68 is a result of a low Swedish inflation rate (a deviation from PPP). As noted above, the *nominal* interest rate was very close to the Eurodollar rate, which is consistent with a credible nominal exchange rate in this period.

lead to rejections of the UIP hypothesis for most exchange rates and periods, including the exchange rate against the basket.

3.7. Conclusion.

Deviations from CIP suggest that capital controls had effects before 1981; to what extent they were an effective constraint after 1981 is uncertain. When we looked at the nominal interest rate differential, we found some periods, when this differential could *not* be motivated by reasonable exchange rate expectations. This is informal evidence against the UIP. Formal tests (by other authors) also tend to reject the UIP hypothesis.

The observed deviations from CIP and UIP lead us to conclude that the Riksbank had some control over interest rates and the supply of money and bank loans. The influence appears to be limited, however: during the periods 1960–1970 and 1983–1986, when the exchange rate was reasonably credible, the nominal interest rate differential was, for the most part, less than 2 percentage points.

4. INDICATORS OF MONETARY POLICY.

4.1 Choice of Indicators and Definitions.

The following variables will be used as indicators of monetary policy: *nominal interest rate*, *money supply* and *bank loans*. Of course, we do not know to what extent these variables were controllable, but our analysis in the previous section suggested that the Riksbank had some control over these variables. We also look at the *real interest rate* and *real money supply and real bank loans*. We examine these variables to see whether any pronounced cyclical patterns emerge. In practice, our reference paths will be unchanged interest rates and unchanged growth rates for money supply and bank loans, relative to the recent history.

Bank loans, L, refers to total bank loans to the public in Swedish crowns (SEK). During the period of credit regulations, the focus of attention of policy–makers was on non–priority ("other") bank loans, where priority building credits are excluded. Since priority building credits are a fairly small fraction, the two series are quite similar.[20]

We exclude loans from Swedish banks in foreign currency. A bank that extends a loan in foreign currency will normally close its position in foreign currency, e. g. by taking a corresponding loan from a foreign bank. Thus, the bank is intermediating credit from abroad. Since the loan from the foreign bank is not subject to (primary or secondary) reserve requirements, loans in foreign currency are not affected by Swedish monetary policy in the same way as loans financed by domestic deposits.[21]

The definition of *money* is problematic since there is a spectrum of assets with varying degrees of liquidity. We do not regard currency as controllable, so this is not a meaningful indicator of monetary policy, and it is difficult to make a distinction between time and demand deposits in Sweden. A distinction can be made between ordinary and special deposits, however. Special deposits are only available to agents with considerable financial wealth, and they are very close substitutes to certificates of deposits and treasury discount notes (statsskuldväxlar). "Allemanssparande" (national saving) is government

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[20] Priority building credits increased from around 10 % of bank loans in 1960–64 to 16 % in 1973, and then varied around 13–16 % until the concept disappeared with the deregulation in 1986.

[21] On the other hand, one may argue that what matters for aggregate demand is total bank loans available, including those refinanced abroad. We will return to loans in foreign currency, when we discuss broader measures of credit availability in section 5.

borrowing in the form of a deposit account with tax advantages and a withdrawal fee. There is also an implicit withdrawal fee since only a limited amount can be deposited each month: if money is withdrawn, one loses future tax advantages. These deposits are therefore relatively illiquid.

We will focus on two measures of money/liquidity. The first, M3X, includes currency and ordinary deposits in SEK, where deposits obviously dominate. The second, LIQ, also includes "allemanssparande", special deposits, certificates of deposits, and treasury discount notes (statsskuldväxlar), all in Swedish currency.[22]

Our measure of the *short term interest rate* is the same as in the previous section: the special deposit rate for most of the period. Activity is measured by industrial production, YM. (Quarterly data for GNP are not available for the 1960's.) Further information about the data is given in the appendix.

We will examine growth rates for the stocks, and levels for interest rates. Since we are interested in business cycle variation in the data, we want to eliminate uninteresting short–run fluctuations and (possibly changing) seasonal patterns. For this reason, most series are plotted as five quarter geometric moving averages, centered on the quarter, with weights 1/8, 1/4, 1/4, 1/4, 1/8.[23]

4.2. A Comparison of Alternative Indicators of Monetary Policy.

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[22] One definition of M3 includes currency, all bank deposits, and certificates of deposits. Since treassury discount notes are equivalent (for the holder) to certificates of deposits, and both are very close substitutes to special deposits, it is unlikely that a stable demand function exists for M3 defined this way.

[23] Geometric moving averages are taken of *gross* quarterly growth rates and interest rates. Moving averages of the quarterly growth rates are then converted to annual rates. The resulting series is almost identical to a four quarter growth rate, but the series is not shifted in time, so turning points can be properly identified.

Figure 4:1 shows the nominal interest rate, inflation and the realised real interest rate measured from period t to t+1. (The scale for the real rate is on the right.) During the first half of the period, the nominal rate was regulated (officially or inofficially), and it appears quite sluggish. In terms of the nominal interest rate, monetary policy was contractive – compared to the preceding years – in the periods 1969–70, 1977, 1980–1981, and 1985.

Before 1980, increases in the nominal rate were usually associated with larger increases in inflation, so that the nominal and the realised real rate moved in opposite directions. Until 1981, the short–run changes in the real rate are almost a mirror image of changes in the inflation rate.[24] This may reflect slowly adjusting expectations of inflation and/or stabilisation of the nominal interest rate by the Riksbank. From 1980 the nominal and real rate are positively related. As we noted in the previous section, the decrease in the real rate in the early 1970s, and the increase around 1980 are international movements, which should not be ascribed to Swedish monetary policy.

Figure 4:2 shows that there are large variations in the growth rates of the two money/liquidity aggregates and bank lending. Substantial differences between M3X and LIQ occur primarily in 1972–73 and 1978–79, when special deposits increased rapidly, around 1983, when treasury discount notes increased, and in 1986, when treasury discount notes decreased.

Money leads slightly relative to bank loans.[25] The major differences between

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[24] This is not a necessary implication of the definition of the real interest rate. For example, in a classical model with perfect foresight, there is no reason to expect a negative correlation between the real interest rate and the inflation rate. Forecast errors with respect to inflation would generate a negative correlation in a classical model, however.

[25] One interpretation of the money's lead relative to credit is that credit expansion

M3X and bank lending arise as a result of changes in the quantitative controls. The quantitative constraints were eased in 1962 and tightened in 1969–70 and 1979–82. A dramatic difference between money and bank loans occurs after the deregulation in 1985.

Figure 4:3 shows the growth rate of real and nominal money supply. Accelerations (decelerations) in nominal money growth tend to be associated with accellerations (decellerations) in real money growth. There are sharper swings in real than in nominal growth rates. The correlation between nominal and real bank loans appears weaker than the corresponding correlation for money (*Figure 4:4*).

How are interest rates related to the quantitative indicators? In *figure 4:5* the nominal and real interest rates are plotted with the growth rate of nominal money supply. Reductions in money growth tend to be associated with increases in the nominal interest rate, and conversely. (The main exception is the period 1980–1983.) In *Figure 4:6* we see a similar negative relation between changes in credit growth and the nominal interest rate. The real interest rate appears to be unrelated to the growth rates of money and bank loans.

Thus, if we look at the rate of growth of money and credit, and the nominal interest rate, we get a fairly coherent characterisation of monetary policy. The periods 1969–70 and 1984–1985 stand out as contractive by all the indicators: low growth rates for money and bank loans (real and nominal), and high nominal interest rate, compared to the preceeding years. The periods 1967–68, 1972–73, 1978–79, and 1986 appear expansive. For other periods, e. g. the mid 1970s and the early 1980s, and the period after 1986, the characterisation depends on what variable one looks at.

4.3. The Cyclical Pattern.

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is sluggish. Evidence of this was found by Gottfries–Persson–Palmer (1989).

Figure 4:7 shows nominal and real interest rates and the rate of change of industrial production. The nominal interest rate tends to increase towards the end of a recovery. Since inflation is also procyclical, the real interest rate has no clear cyclical pattern.

Nominal and real money supply appear countercyclical before 1972 and after 1981, but procyclical 1972–81 (*Figures 4:8* and *4:9*). Nominal bank loans lead the cycle before 1972, but the picture is less clear thereafter (*Figure 4:10*). Real bank loans are strongly procyclical 1972–1981 (*Figure 4:11*).[26]

Has monetary policy been stabilizing the price level? In *Figure 4:12* we see that the increases in inflation in 1965 and 1970 were met by contractive monetary policy. In the 1970's monetary policy was largely accomodating the higher inflation rate. The inflation rate was inconsistent with the target of a fixed exchange rate. The devaluations in 1976, 1977, 1981 and 1982 were preceeded by several years with relatively high money growth rates. After the devaluation in 1982, money growth was below the inflation rate, except in 1986.

4.4 Was Monetary Policy Countercyclical?

Since the nominal interest rate increased when output was high, one may argue that monetary policy was countercyclical compared to a more stable interest rate policy. On the other hand, the interest rate increased so late in the booms, that it may have contributed to the downturns rather than stabilised the expansions.

For the quantities, the cyclical pattern is not constant across the period. Compared to a constant money growth rate, monetary policy appears

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[26] One may argue that if a high money growth rate coincides with high growth of output, this is not destabilising if the *level* of output is low. It may therefore be better to look at trend deviations of the variables. Trend deviations are sensitive to the definition of the trend, however.

countercyclical (stabilising) in the 1960s and the 1980s, and procyclical (destabilising) in the 1970s.[27] Real money and bank loans were strongly procyclical in the 1970s. With respect to prices the picture is similar: monetary policy was more consistent with price (and exchange rate) stability in the 1960's and in the 1980's than in the 1970's.

The changes in the pattern of monetary policy may reflect changing preferences of the policy–makers and/or changes in the policy–environment. For example, there were probably larger shocks in the 1970s than in the 1960s, and more emphasis on interest rate stabilisation in the 1970s than in the 1980s. The procyclical pattern in the 1970's may be a result of lags in policy–making. Eklöf emphasises lags in policy–making due to the political process (see Eklöf, 1990 b, page 24).

5. BROADER CREDIT AGGREGATES.

As discussed in section 2, monetary policy may affect aggregate demand through its effect on bank credit. But if other intermediaries can fulfill a role similar to that of banks, monetary policy may have a limited effect on the total availability of credit. This issue is important, since the amount of credit extended by non–bank intermediaries is of the same order as bank loans. One may suspect that unregulated intermediaries tended to replace banks when banks were regulated.

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[27] Jonung (1981) found that most types of deposits were countercyclical 1954–1971, and especially 1963–71. Whether currency is included in the definition of money does not matter very much since currency holdings are so small relative to deposits. Myhrman (1973) also noted that monetary policy had been countercyclical as measured by the money supply.

In this section we will examine broader measures of credit availability. First, we include direct credit from other intermediaries than banks. Second, we include also loans in foreign currency from intermediaries (mainly banks). Third, we compare these measures of credit to total gross debt of households and firms.

We examine these wider measures of credit availability to see whether there are signs that credit from other intermediaries has replaced bank loans, and whether the cyclical pattern for total credit differs from the cyclical pattern of bank loans.

To what extent these wider measures of credit were controllable is not clear, but as we will see, the Riksbank used various instrumants (capital controls, placement ratios, control of bond issues) to influence credit from other intermediaries. Before we look at the data, we will briefly describe the role of non–bank intermediaries as direct lenders to the public and the regulations that applied to them.

5.1. Non–bank Financial Intermediaries.[28]

Non–bank financial intermediaries include mortgage institutions & credit companies, insurance companies and finance companies.[29] Mortgage institutions & credit companies are usually classified into three categories: housing credit institutions, business credit institutions and local government credit institutions.

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[28] The presentation is mainly based on SOU 1978:11, SOU 1988:29 and Hörngren et al (1987). Henrekson (1988) gives a description of the institutions in the Swedish credit market.

[29] The data refers to nation–wide insurance companies. Before the "law on finance companies", enacted in 1980, the term "finance company" (finansbolag) was not used for this type of financing firm. We use "finance company" throughout, even though the definition of firms covered in official statistics is different before 1980.

Local government credit institutions, which lend to local government, will not be included in the analysis below.[30]

Quantitatively, *housing credit institutions* were –by far – the most important intermediaries beside banks. The role of housing credit institutions is to give long–term financing to the housing sector. In the process of financing housing investments, short–term construction credit extended by banks is replaced by long–term loans from the housing credit institutions.

Among *finance companies,* we find both large finance companies owned by banks, offering a great variety of financial services, and small specialized companies. In 1987, 15 out of 278 registered finance companies were owned by banks, but they accounted for 1/3 of total credit extended by finance companies to the public (SOU 1988:29, p. 357). The existence of finance companies can partly be seen as a result of restrictions placed on the banks. Factoring and leasing are financial activities specific to finance companies since the banks have been forbidden by law to supply these financial products. Another aspect of finance companies is that they give loans with higher risks involved than banks may care to do. Before 1984, the law limited a bank's loans without formal securities (mortgage or personal guarantee) to a fraction of the sum of equity and deposits.[31]

The purpose of *business credit institutions* is to facilitate the financing of mainly small and medium–sized firms through long–term loans, guarantees, or

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[30] State lending funds and the National Pension Insurance Fund are not included. State lending fund provide credit mainly for housing and education and the National Pension Insurance Fund gives loans to local authorities and public service companies.

[31] Before 1975, loans without formal security were legally limited to 3% of the banks equity and deposits. This limit was raised to 5% in 1975, to 10% in 1979, and abolished in 1984.

owner participation. The government has taken a large owner responsibility in the sector, either as sole owner or as a partner to banks. *Insurance companies* differ from other intermediaries in having only a small part, 9%, of total assets as direct loans to the public (mainly to business).

Can non–bank intermediaries substitute for banks? Probably the most important input in the credit granting process is information about the specific borrower and his project. An important characteristic of banks is their extensive chains of offices and closer contact with borrowers, giving them an informational advantage relative to other intermediaries.

On the other hand, different financial institutions often interact with each other: banking concerns include finance companies as well as housing, business and local government credit institutions, and insurance companies give loans with bank guarantees.[32] If banks share their information with other institutions and give guarantees, the possibility of substitution increases.

5.2. Regulations of Non–bank Financial Intermediaries.

Housing credit institutions finance their lending primarily by selling bonds. The Riksbank controlled bond issues from these institutions until 1986 and thus indirectly their lending. The volume of housing bonds set to be consistent with government plans for construction.

Loans from housing credit institutions may be classified into priority loans and non–priority loans. Priority loans are given to production and reconstruction of dwellings, usually with loans subsidized by the government, while non–priority loans are other loans against mortgage, e. g. financing purchase of existing dwellings. In the 1960s and 1970s the volume of non–priority lending was

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[32] Ownership relations between insurance companies and other types of financial intermediaries have been legally prohibited.

restricted, by recommendation from the Riksbank, to at most 10% of the institutions total lending. During the period 1980–86, non–priority lending was controlled independently of priority lending.

Finance companies were not subject to the Credit Policy Instruments Act until 1980. Between 1981 and 1985 the Riksbank placed ceilings and restrictions on various types of credit (including leasing) extended by finance companies. The *number* of active finance companies was not controlled, however. The number of registered finance companies increased from 111 in 1980 to 213 in 1985.

According to the credit regulations in force until 1986, *insurance companies* had to invest a major fraction of the increase in their assets in government bonds and priority housing bonds. Within the unregulated share of their portfolio, they could choose between shares, industrial bonds, and direct credit.

In conclusion, there seems to have been considerable scope for finance companies to substitute for banks as lenders to the public. Insurance companies were free to lend within the unregulated part of their portfolio. Housing credit institutions were regulated until 1986. Furthermore, priority loans, which constituted the main part of loans from these institutions, were only available for production and reconstruction of dwellings.

5.3. Long Run Trends.

Due to lack of quarterly data for some series, the analysis in this section is based on annual data. Definitions and sources are given in appendix C. *Figure 5:1* shows credit extended by financial intermediaries to the public as a fraction of GDP. After a slow increase before 1985, intermediated credit has increased dramatically in recent years. Although there has certainly been an increase in the availability of credit after the deregulation, there is reason to believe that this figure exaggerates the change. The regulations had stimulated unorganized credit. Also, financial intermediaries themselves had developed ways to avoid the credit

ceilings, by transferring parts of their loan portfolios to other creditors by the end of the month, thus reducing the volume of outstanding loans reported to the authorities. When the credit ceilings were abolished in November 1985, these loans reappeared on the balance sheets.[33]

Loans in foreign currency come primarily from banks, and such loans are normally refinanced abroad. The growing importance of loans in foreign currency is evident. The fraction of loans denominated in foreign currency increased from close to zero in the mid 1970s to 20 % in 1989.

Table 5:1 shows that banks' share of intermediated credit diminished continuously until 1986, but banks have since then regained some lost ground. It was primarily housing credit institutions that expanded their share of outstanding loans to the public, from 17% in 1961 to a high of 39% in 1987. Also, finance companies increased their share to a peak of 9 % in 1987.

The insurance companies, on the other hand, lost market shares, from 13% of total intermediated credit extended to the public in 1961, to 2% in 1989. As a share of insurance companies' total assets, direct credit fell from 41% in 1970 to 20% in 1985 (SOU 1987:58, p.191), while the shares of bonds and equity increased.[34]

5.4. Short Run Fluctuations.

Figure 5:2 shows the rates of change of industrial production and real credit in SEK from banks and non–bank financial intermediaries. During the 1970s, non–bank credit was less procyclical than bank loans. In 1969–70 and in the early

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[33] af Jochnick (1987) claims that this artificial flow of credit amounted to 20 billion SEK during November–December 1985, which corresponds to 2% of GDP.

[34] If industrial bond had been included in credit from insurance companies, their share would have been larger. We focus on direct loans, where the role of intermediaries in monitoring credit is likely to be important.

1980s, when bank loans in kronor were constrained by quantitative regulations, other intermediaries did not contract as sharply. In the 1980s, non–bank credit grew much more rapidly than bank loans. In *figure 5.3,* loans in foreign currency are included. The picture is similar, but bank loans including loans in foreign currency grew faster in the 1980s.

Figure 5:4 shows real credit in SEK from banks, housing credit institutions, and finance companies. Loans from housing credit institutions increased rapidly in the late 1960s, the growth rate declined smoothly in the 1970s, and increased rapidly in the 1980s. This development is quite similar to that of bank credit, but housing credit was less variable. Finance companies did not play a quantitatively important role until the late 1970s; in the 1980s, they contributed substantially to fluctuations in credit availability.

In the 1970s, credit from finance companies appears to be a buffer relative to bank loans, but this is not true in the 1980s. For the period as a whole, there is little evidence that other institutions expand when bank loans contract, or conversely.

Finally, *figure 5:5* shows that total real intermediated credit (in SEK and foreign currency) is clearly procyclical through the whole period until the deregulation. Also, credit from intermediaries is closely correlated with total debt of households and non–financial business. Beside loans from financial intermediaries, total debt consists of bonds and debentures, loans from non–financial business, households and local government and domestic and foreign trade credit. The figure suggests that if monetary and credit policy affects credit from financial intermediaries, it will also affect the total credit available to households and firms.[35]

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[35] Ingves (SOU 1982:52) analyzed the importance of unorganized credit in the 1970s and Kragh (SOU 1988:29) extended this analysis to 1985. The conclusion in these

5.5. Conclusion.

Credit from non–bank financial intermediaries is as important as bank credit and can be a close substitute to bank credit. The most important non–bank intermediaries were regulated until the mid 1980s, but the unregulated finance companies grew rapidly from the late 1970s. Thus, the Riksbank's ability to control total credit by quantitative regulations was gradually reduced. Real direct credit from intermediaries was procyclical most of the time.

6. INSTRUMENTS OF MONETARY POLICY.

Which instruments did the Riksbank use to control money, credit and interest rates? In order to study this question, we must first analyse the institutional framework and the regulations. There were continuous changes in the regulations, with a major deregulation occuring in the mid 1980s. The description below will focus on the situation in the 1970s.

6.1. Borrowing in the Central Bank.

Until november 1985, banks could borrow a specified amount from the central bank at the discount rate, while a "penalty rate" applied for amounts above that limit.

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studies is that unorganized credit (trade credit etc.) seems to be a buffer during the 1970s, but that no clear pattern exists in the first half of the 1980s. These studies differ from ours in two important respects. First, they do not look at credit available to the private sector, but claims of the private sector, including claims on the government and the foreign sector. Second, they make a distinction between regulated and unregulated credit, where regulated credit includes bonds, while we focus on credit from intermediaries.

Excess reserves could be deposited at the national debt office.[36] For a bank, a close alternative to central bank borrowing is to sell short–term government securities, so we would expect banks to borrow until the marginal cost of borrowing equals the expected return on government securities.

Suppose, for example, that the rate on treasury bills is above the discount rate, but below the penalty rate. In a static situation, banks should borrow up to the limit where the penalty rate starts to apply. If the treasury bill rate is below the discount rate, banks should not borrow from the Riksbank, and if the treasury bill rate is equal to the penalty rate, banks are indifferent with respect to the level of borrowing and treasury bill holdings. Thus, banks' borrowing from the Riksbank, R^{bb}, should depend (discontinuously) on the interest rate on treasury bills, r_b, and the penalty rate, r_p, and the discount rate, r_{dis}:

$$(8) \qquad R^{bb} = R^{bb}(r_b, r_p, r_{dis}) .$$

Today, a well developed secondary market exists, where government securities can be sold at short notice. In the 1960s and 1970s, the secondary market for bonds and treasury bills was not well developed, so a bank could not immediately reduce its holdings of government securities. However, banks would normally hold treasury bills and government bonds with short term left to maturity, so they could reduce their holdings by not buying new ones as the old

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[36] Since 1985, a more elaborate "interest rate ladder" applies, where the marginal cost of funds increases in several steps with the amount borrowed by a bank. See Norgren (1986), Henrekson (1988), Gottfries,Persson och Palmer (1989), Englund, Hörngren and Viotti (1986, 1989) Hörngren and Westman–Mårtensson (1990) for more detailed analysis of central bank borrowing in Sweden.

ones matured,[37] and banks could normally buy treasury bills from the National Debt Office if they wanted to increase their holdings of treasury bills.[38]

The above analysis disregards temporary disequilibria, however. Suppose that there is an unforeseen reduction in deposits due to a capital outflow. Banks as an aggregate cannot immediately reduce their holdings of government securities, and loans can only be reduced slowly, so they must increase their borrowing. Conversely, if there is an increase in deposits which is perceived as temporary, banks will not buy government securities since they cannot sell them immmediately when deposits decrease; instead they reduce their borrowing. Therefore, discount window borrowing buffers shocks coming from the government budget, capital flows etc.[39]

6.2. Money and Credit Control with Liquidity Ratios.

In Sweden, there have been both primary and secondary reserve requirements. Cash reserve ratios have typically required banks to hold a fraction of deposits in the form of vault cash and deposits in the Riksbank. Liquidity ratios essentially required banks to hold a fraction of their deposits in the form of government and housing bonds, treasury bills and *net* cash reserves. Liquidity ratios were in force

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[37] Since the numerator in the "liquid ratio" included *net* cash reserves, liquidity ratios did not prevent banks from selling bonds in order to reduce borrowing.

[38] Long–term bonds were usually offered a few times a year, while treassury bills were essentially always available from the National Debt Office at some announced interest rate. (See the Yearbook of the National Debt Office.) Most of the time, banks had positive holdings of treassury bills.

[39] Gottfries, Persson and Palmer (1989) tried to estimate buffer effects, with mixed results. They found some evidence that bank reserves tend to buffer unexpected changes in special deposits.

until mid 1983, and appear to have been binding most of the time (see below).[40] With two types of reserve requirements in force, which definition of reserves is relevant for analysing the supply of money and credit?

In order to simplify the analysis of this question, we will consider a closed economy. Consider the typical situation in the 1970's, with binding liquidity ratios, and a two–step interest rate ladder. We disregard the temporary buffer effects on R^{bb} that were discussed above. Suppose that the cash reserve ratio is binding and that banks do not hold claims on the National Debt Office:

$$(9) \quad k^r D = R^a + R^{bb}(r_b, r_p, r_{dis}) - R^p,$$

where D is deposits, k^r is the required cash reserve ratio and R^a is the non–borrowed (adjusted) monetary base. Currency holdings of the public, R^p, will be taken as given in the short run.

The traditional textbook analysis is to divide this equation by k^r and argue that it defines a supply schedule relating deposits (money) to the interest rate, the cash reserve ratio, unborrowed monetary base etc. However, if the liquidity ratio is also binding, then

$$(10) \quad \ell^r D = R^a + B^g + B^h - R^p - B^p,$$

where ℓ^r is the required liquidity ratio, B^g is the outstanding volume of government bonds, B^h is the outstanding volume of housing bonds, and B^p is holdings of government and housing bonds outside banks.

During the regulated period, essentially all regular government and housing

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[40] Ceilings on bank credit were used in some periods. We will not discuss them in the present paper.

bonds outside banks were held by insurance companies and the social insurance fund[41]. Since both types of institutions were regulated, it is reasonable to take B^p as given. The sum $R^a + B^g$ (essentially outstanding government debt) will also be taken as given. If outstanding housing bonds, B^h, are also taken as given, equation (10) determines deposits.

For given values of the right–hand–side variables and the two reserve requirements, equations (9) and (10) may imply different levels of deposits. Hence, all the right hand side variables in these two equations cannot be determined independently. At least one of them must be determined by the others – or the two reserve requirements cannot be simultaneously binding.

One resolution to this paradox is to treat B^h as endogenously determined: the supply of housing bonds, adjusts to demand for housing bonds. Then, equation (10) determines B^h rather than D:

$$(11) \quad B^h = \ell^r D - (R^a - R^p) + B^p - B^g.$$

Now, the liquidity ratio fulfills a purely allocative role: it does not affect the quantities of money or credit, provided that "credit" is defined to include credit to housing.

But this interpretation of the liquidity ratio overlooks the fact that residential construction was firmly controlled by the government during this period, and that issues of housing bonds were controlled by the Riksbank. Thus, the supply of housing bonds did not adjust passively to demand for housing bonds. Therefore, it is reasonable to take B^h as given in an analysis of monetary policy. Then, equation (10) determines the quantity of deposits:

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[41] Households held other types of bonds which were not held by institutional investors.

$$(12) \quad D = \frac{1}{\ell^r}(R^a + B^g + B^h - B^p - R^p),$$

and the base concept relevant for controlling the money supply is "liquid assets": the traditional adjusted monetary base plus government and housing bonds ($R^a+B^g+B^h$).[42] For example, if there is an increase in the liquidity ratio, banks reduce loans and demand more bonds, but since other bond–holders are regulated, banks cannot buy bonds from them. They will therefore buy government bonds or treasury bills from the National Debt Office, and bank loans and deposits contract.

Of course, one may argue that an increase in the liquidity ratio which is associated with sale of government securities is really an open market operation, but *the key instrument was the liquidity ratio, rather than the monetary base and cash reserve requirements.* To see this, note that even if an increase in the liquidity ratio was *not* accompanied by an increased supply of treasury bills, there would be a reduction in loans and deposits. If banks cannot buy treasury bills, they must fulfill the liquidity ratio by reducing borrowing from the Riksbank, or increasing deposits at the National Debt Office. (Recall that the numerator in the liquidity ratio includes *net* claims on the Riksbank and the government.) Again, there is a contraction of bank loans and deposits.

The conclusion that liquidity ratios could be used to control money and credit relies crucially on the assumptions that both holdings of "priority" bonds outside banks and issues of housing bonds were controlled by the Riksbank.[43] If

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[42] Following Cagan (1965), Jonung (1974) decomposed the money supply 1871–1971 into base, currency ratio and reserve ratio. Our interpretation is that at least in the 1970's, the traditional monetary base adjusted passively, and the determination of the money supply is better understood in terms of secondary reserves and secondary reserve requirements.

[43] Differing assumptions on this point seem to be a crucial difference between

this had not been the case, banks could have bought bonds from the non–bank private sector, or issues of housing bonds could have increased, when liquidity ratios are raised.

The liquidity ratio could also be used as a purely allocative device, however. If an increase in the liquidity ratio was combined with a permission to housing credit institutions to issue a corresponding amount of housing bonds, deposits would remain unchanged, and the effect would be to reallocate credit to housing. Thus, liquidity ratios could be used both to control bank loans and deposits, and for allocative purposes.[44]

6.3. Interest Rate Determination.

With deposits determined by equation (12), what is the role of equation (9)? Let us rewrite it as

$$(13) \quad R^a + R^{bb}(r_b, r_p, r_{dis}) = k^r D + R^p .$$

Given k^r, D and R^p, the supply of reserves must adjust to demand – either through open market operations by the Riksbank, sale of bonds by the National Debt Office, or discount window borrowing.

In theory, a market operation can be used to control bank borrowing and short–term interest rates. Suppose, for example, that the rate on treasury bills is

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Myhrman (1973 b) and Hansson (1973). Our conclusions appear to be roughly consistent with the views expressed by Eklöf (1990 a, pages 29–32).

[44] Put differently, the effect of an increase in the liquidity ratio depends on what other variables are kept constant. The effects of liquidity ratios and loan ceilings were debated in the mid 1970s, see Myhrman (1973 a, b, 1975), Ettlin–Lybeck (1975), Hansson (1973) and subsequent issues of Ekonomisk Debatt 1975.

between the discount rate and the penalty rate, and banks borrow up to the penalty rate limit. If the Riksbank sells treasury bills (R^a falls), the treasury bill rate will increase to equal the penalty rate, and banks start to borrow from the Riksbank to buy bills. Similarly, an increase in k^r, given R^a, will raise the interest rate.

In practice, however, banks could normally buy the amount of treasury bills they wanted from the National Debt Office at a predetermined interest rate, and the Riksbank did not pursue regular market operations in the 1970's. When the National Debt Office behaves this way, unborrowed reserves will adjust passively to maintain equality in (13). This makes the cash reserve ratio ineffective. If the cash reserve ratio is raised, the only effect is that banks replace treasury bills by reserves. (Immediately, banks cannot sell their treasury bills, so an increase in required cash reserves will lead to a temporary increase in discount window borrowing.)

Interest rates on ordinary deposits and bank loans were regulated (formally or informally) and they followed the official discount rate closely. Bond rates were also regulated. The rate on special deposits was subject to informal regulations until the mid 1970's. (For example, the Riksbank gave recommendations concerning this rate in a letter to banks in October 1975.) In the 1970s, the special deposit market became gradually more competitive, and one would expect it to be determined by the return on bank assets (treasury bills, bonds, bank loans).

6.4. Modifications for the Open Economy.

In the open economy, unborrowed reserves (R^a) includes a foreign component which depends (positively) on the interest rate because of interest–elastic capital flows. Hence, an increase in the treasury bill rate, which leads to a corresponding increase in the special deposit rate, will lead to a capital inflow and an *increase* in

deposits and loans according to equation (12).[45] Thus, when there is rationing in the bank loan market, an increase in the interest rate may be expansionary!

Capital flows may also depend on the availability of domestic credit. This modifies the effect of the liquidity ratio since the reduction in bank loans is replaced by increased borrowing abroad. Estimates by Lybeck (1975, ch. 9) and by Gottfries–Persson–Palmer (1989) suggest that this effect is small, however.

6.5. How Were the Instruments Used? A Look at the Data.

The above analysis suggests the following role for the various instruments. Liquidity ratios could be used to control bank loans and deposits, while cash reserve ratios had only temporary effects on discount window borrowing.. By regulation, the discount rate determined interest rates on deposits and bank loans. The special deposit rate was subject to recommendations from the Riksbank until the mid 1970's. Thereafter, the special deposit rate was set competitively, but the Riksbank could influence it indirectly, by influencing the return on banks' portfolios. We will now look at some of the relevant data, to see how the instruments were used in practice.

Let us first consider *cash reserve requirements*, *market operations*, and *sales of treasury bills by the National Debt Office*. Define "monetary base" in the conventional way as bank reserves and currency. *Figure 6:1* shows various components of the monetary base and required cash reserves. Cash reserve

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[45] This is opposite to the textbook relation between changes in money and the interest rate. Note that we consider an experiment where the own rate on money (defined as currency plus total deposits) increases – as opposed to the ISLM–model, where the interest rate is the rate on non–money. Futhermore, since liquidity ratios are binding, the interest rate does not affect banks' choice between government bonds and private loans.

requirements have essentially been binding since they were introduced in 1969. (From July 1975 vault cash counted towards fulfillment of cash reserve requirements.) *Figure 6.2* shows the treasury bill rate, the discount rate, the penalty rate, and (later) the marginal rate on banks' borrowing from the Riksbank.

Most of the time before 1982, banks held positive amounts of treasury bills, the treasury bill rate was between the discount rate and the penalty rate, and discount window borrowing varied around the penalty rate limit. The main exception is 1972–1973, when the treasury bill rate was consistently below the discount rate and, as expected, banks did not borrow from the Riksbank. In 1962, 1967, 1976 and 1979 the treasury bill rate dipped below the discount rate although there was positive borrowing. On the latter two occations, treasury bill holdings were approximately zero, so the treasury bill rate was not the relevant return on government securities. Treasury bills disappeared from the market in 1982, and thereafter, the rate on treasury discount notes is approximately equal to the marginal cost of borrowing from the Riksbank.

The increase in the cash ratio in 1974 was associated with an increase in banks' borrowing – but note that the treasury bill rate was raised to equal the penalty rate at the same time. On the other occasions when cash reserve ratios were raised, 1977, 1979, 1982, 1986, there were no significant increases in borrowing from the Riksbank: the supply of unborrowed monetary base adjusted. This is consistent with the view that the National Debt Office (or the Riksbank) pegged the interest rate, so cash reserve ratios were ineffective.

But what was then the purpose of changes in cash reserve requirements? There may have been short–run effects on discount window borrowing in 1977, 1979 and 1982, which are not visible in the quarterly data. The increase in the cash reserve ratio in January 1986 was associated with a decision to stop paying

interest on required reserves.[46] The purpose may have been to raise lending rates without raising deposit rates (which would have created a capital inflow) so as to counteract the credit expansion that would follow from the deregulation. The same may apply to the increase in the cash reserve requirement in 1988

The monetary base consists of non–borrowed (adjusted) monetary base and borrowed reserves. *Figure 6:3* shows a clear negative correlation between changes in these two components. This illustrates the short–run buffer role of discount window borrowing. A currency outflow or a budget surplus leads to a reduction in non–borrowed base, and the immediate impact of this is to increase bank borrowing. There is a strong seasonal pattern in bank borrowing in the late 1970s and early 1980s, probably associated with seasonality in the government budget. This is not necessarily inconsistent with the view that the National Debt Office pegged the interest rate. As we discussed above, banks may prefer to vary their borrowing in the face of temporary shocks.

Let us now turn to *liquidity ratios*. *Figure 6:4* shows the required and actual *liquidity ratio equivalent* for all banks taken together. The liquidity ratio equivalent is defined as the fraction of deposits that banks could *not* lend without violating liquidity ratio regulations and other regulations, given other assets and debts on the balance sheet. The exact definition is given in the appendix. Commercial banks were subject to liquidity ratios until 1983. Savings banks were formally unregulated between 1962 and 1969, but there were informal agreements with the Riksbank. In our calculations, we assume that these informal agreements were binding.[47] The rules for the liquidity ratios were changed in February 1975:

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[46] From May 1 1970 until January 13 1986, banks were paid the discount rate on required reserves. Often this payment was contingent on the bank following the recommendations and regulations of the Riksbank (liquidity ratios etc.).

[47] In the 1960s, savings banks held relatively little bonds, but a major part of their

before this date, liquidity ratios applied each month, which meant that banks had to hold a margin most of the time. After that date, liquidity ratios applied to a 12–month average, which explains the smaller margin.

Let us note two things. First, the liquidity ratios appear to have been binding most of the time, with the possible exception of 1962–63 and 1973–74. Second, there is no clear cyclical pattern. While liquidity ratios were used countercyclically in 1961–62 and 1969–70, there is no systematic pattern for the period as a whole.

When liquidity ratios had been abolished, banks were subject to loan ceilings until November 1985. The actual liquidity ratio equivalent falls drastically after the deregulation, to a number close to zero. The rapid expansion of bank loans (relative to deposits) was financed not only by sales of bonds, but also by changes in other parts of the balance sheet.

6.6. Some Notes on the Determination of the Money Supply.

When the liquidity ratio was a binding constraint, changes in deposits were essentially determined by the liquidity ratio, the government deficit, issues of housing bonds, bond sales outside the banking system, and the change in foreign exchange reserves of the Riksbank (see equation 12). These are also the factors that Eklöf (1990 a,b) and Ström (1980) focus on in their reviews of monetary policy. We have not made a systematic analysis of the factors that affected the supply of money and credit, but we will give a brief ooverview of the factors that contributed to variations in the monetary growth rate (*figure 4:2*). This discussion

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lending was loans to new dwellings, which counted as "priority assets". After the formal deregulation in june 1962, savings banks still had to report their lending and its composition to the Riksbank, and there were recurrent meetings between the Riksbank and the savings banks, where informal agreements were made.

is based on data reported by Ström (1980).

The high money growth rate in 1962 was mainly due to the decrease in the required liquidity ratio in November 1960. The slow money growth rate in 1965 was partly due to strong government budget, and the high money growth rate in 1966–67 can be associated with rising government deficits. The slowdown in money growth in 1969–70 was a result of a currency outflow in 1969, increasing liquidity ratios, and loan ceilings.

The high money growth rate in 1971–75 was due to several factors. First, effective liquidity ratios were reduced and loan ceilings abolished, then there was a currency inflow, then rapidly growing budget deficits. The increase in the interest rate relative to foreign rates in 1974 created a capital inflow in 1975, which contributed significantly to the high money growth rate. (This is an example of the "perverse" effect of an interest rate change, which was discussed above.) The slowdown of money growth in 1976 can be related to a currency outflow and a decrease in the government deficit. The rapid growth of liquidity 1977–1982 was result of large budget deficits. Although required liquidity ratios were raised continuously, this could not prevent the increase in liquidity.

After 1982, a larger part of the deficit was financed outside the banking system, government deficits decreased, and the government reduced its borrowing abroad. All these factors probably contributed to the slower growth of the money supply after 1982.

6.7. Conclusion.

Since the National Debt Office pegged the interest rate on treasury bills, cash reserve ratios had, at most, temporary effects on discount window borrowing. Liquidity ratios, budget deficits, currency flows, and bond sales outside banks were the main determinants of the money supply in Sweden. It is quite clear that budget deficits were a major explanatory factor. Monetary policy appears to have

been unable to completely counteract the effects of budget deficits. More research needs to be done on the money supply process, however.

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APPENNDIX A. QUARTERLY DATA: DEFINITIONS AND SOURCES.

Variable names correspond to those used in the text, but variable names are written without super–indices.

Abbreviations.

NDO National Debt Office
SY Riksbank Statistical Yearbook
QR Riksbank Quarterly Review
FI Finacial Inspection, "Månadsstatistik, banker"
SM Statistics Sweden: Statistical Report
AM Statistics Sweden: "Allmän månadsstatistik", (general monthly statistics)
BIS Bank for International Settlements
x.1 x dated previous period

Interest Rates and Exchange Rates (end of quarter if nothing else written).

idis discount rate in Sweden
source: Riksbank, weekly report:"Assets and liabilities" and QR

id interest rate on savings deposits at 12–months notice in Sweden
source: SY

is interest rate on special deposits in Sweden
is = is1 as from 1968 up to 1971
=is2 as from 1972 up to 1982
$is1=is11+i^{dis}$
is11 addition to discount rate, middle of the quarter
source: Handelsbanken, unpublished
idis see above
is2 interest rate on special deposits
source: Handelsbanken, unpublished

ib3stu interest rate on Swedish 3–month treasury–discount notes ("statsskuldväxlar")
1983:1 and 1983:2 is calculated from the interest rate on 3–month bank certificates
1983:3 is monthly average
source: NDO 1983 and 1984, Riksbank, Monetary and Exchange Rate Policy Department, unpublished material 1983:3 and as from 1985

i3 short–term interest rate on large deposits in Sweden
i3 =id as from 1960 up to 1967
=is as from 1969 up to 1982
=ib3stu as from 1983
id, is, ib3stu see above

ir3 real interest rate in Sweden, realized
(1+i3)(Pcl/Pclt+1)4–1
i3 see above, Pcl see below

ib3 NDO's discount rate on treasury bills
source: SY.

imr2 marginal rate that banks actually paid when borrowing in the Riksbank
imr2 =idis 1960:1 – 1961:1
=imr 1961:2 – 1961:4
=idis 1962:1 – 1963:4
=imr 1964:1 – 1966:1,
=idis 1966:2 – 1967:3
=imr 1967:4 –
idis see above
imr up to 1985:4 penalty rate of Riksbank
as from 1986 marginal rate on Riksbank lending to banks
source: QR

___i3u 3–month Euro–market interest rates:
Us USD, US Dollars
De DEM, German Marks
Gb GBP, British Pounds
No NOK, Norwegian Kroner
Dk DKK, Danish Kroner
Fr FRF, French Francs
Be BEF, Belgian Francs
Nl NLG, Netherlands Guilden
At ATS, Austrian Shillings
Ch CHF, Swiss Francs
Ca CAD, Canadian Dollars
It ITL, Italian Lire
Jp JPY, Japanese Yen
Es ESP, Spanish Pesetas
source: BIS, unpublished
Fi FIM, Finnish Mark
Fii3u=Hebafi9b as from 1980:1 up to 1984:4
=Eufin as from 1985:1
Hebafi9b call money in Finland
source: BIS, unpublished
Eufin 3–month Euro–market interest rates
source: BIS, unpublished

W15i3u basket–weighted interest rate
W15i3u= Wi3u1 as from 1977:4 up to 1980:2
=Wi3u2 as from 1980:3
Wi3u1= (WUS/A*USI3U)+(WDE/A*DEI3U)+(WGB/A*GBI3U)+(WNO/A*NOI3U)+(WDK/A*DKI3U)+(WFR/A*FRI3U)+(WBE/A*BEI3U)+(WNL/A*NLI3U)+(WAT/A*ATI3U)+(WCH/A*CHI3U)+(WCA/A*CAI3U)+(WIT/A*ITI3U)+(WJP/A*JPI3U)
W_ the foreign currency as weighted in the currency basket
source: QR
A = WUS + WDE + WGB + WNO + WDK + WFR + WBE + WNL + WAT + WCA + WCH + WIT + WJP
___i3u see above
Wi3u2 = (WUS*USI3U) + (WDE*DEI3U) + (WGB*GBI3U) + (WNO*NOI3U) + (WDK*DKI3U) + (WFR*FRI3U) + (WBE*BEI3U) + (WNL*NLI3U) + (WAT*ATI3U) +

(WCH*CHI3U) + (WCA*CAI3U) + (WES*ESI3U) +
(WIT*ITI3U) + (WJP*JPI3U) + (WFI*FII3U)
W___, ___i3u see above

if15u "foreign" short–term interest rate
if5u =Usi3u as from 1960 up to 1973:2
=Dei3u as from 1973:3 up to 1977:3
=W15i3u as from 1977:4
___i3u see above
___ir3u real interest rate, realized

Us USD, US Dollars
De DEM, German Marks
Gb GBP, British Pounds
No NOK, Norwegian Kroner
Dk DKK, Danish Kroner
Fr FRF, French Francs
Be BEF, Belgian Francs
Nl NLG, Netherlands Guilden
At ATS, Austrian Shillings
Ch CHF, Swiss Francs
Ca CAD, Canadian Dollars
It ITL, Italian Lire
Jp JPY, Japanese Yen
Es ESP, Spanish Pesetas
Fi FIM, Finnish Mark
(1+___i3u)(___pcl/___pclt+1)4–1
___i3u see above, ___pcl see below

W15ir3u basket weighted real interest rate, realized
W15ir3u =Wir3u1 as from 1977:3 up to 1980:2
=Wir3u2 as from 1980:3
WIR3U1 =(WUS/A*USIR3U)+(WDE/A*DEIR3U)+(WGB/A*GBIR3U)+
(WNO/A*NOIR3U)+(WDK/A*DKIR3U)+(WFR/A*FRIR3U)+
(WBE/A*BEIR3U)+(WNL/A*NLIR3U)+(WAT/A*ATIR3U)+
(WCH/A*CHIR3U)+(WCA/A*CAIR3U)+(WIT/A*ITIR3U)+
(WJP/A*JPIR3U)
W___, A, ___ir3u see above
WIR3U2 =(WUS*USIR3U)+(WDE*DEIR3U)+(WGB*GBIR3U)+
(WNO*NOIR3U)+(WDK*DKIR3U)+(WFR*FRIR3U)+
(WBE*BEIR3U)+(WNL*NLIR3U)+(WAT*ATIR3U)+
(WCH*CHIR3U)+(WCA*CAIR3U)+(WES*ESIR3U)+
(WIT*ITIR3U)+(WJP*JPIR3U)+(WFI*FIIR3U)
W___, ___ir3u see above

ifr15u "foreign" real interest rate, realized
ifr15u =Usir3u as from 1960 up to 1973:2
=Deir3u as from 1973:3 up to 1977:3
=W15ir3u as from 1977:4
___ir3u see above

idiff15u the difference between the Swedish and the "foreign"
short term interest rate
idiff15u=i3–Usi3u as from 1960 up to 1973:2
=i3–Dei3u as from 1973:3 up to 1977:3
=i3–W15i3u as from 1977:4

i3, ___i3u see above

irdiff15u the difference between the Swedish and the "foreign" realised real interest rate

irdiff15u =ir3–Usir3u as from 1960 up to 1973:2
=ir3–Deir3u as from 1973:3 up to 1977:3
=ir3–W15ir3u as from 1977:4
ir3, ___ir3u see above

CIP deviations from CIP
CIP =i3–Usi3u–Usfpmu% 1972 up to 1973
=i3–Usi3u–Usfpu% as from 1974
i3, Usi3u see above

Usfpmu% 3–month forward exchange rate SEK/USD
average of ask and bid rate
source: Riksbank, unpublished

Usfpu% 3–month forward exchange rate SEK/USD
ask rate
source: Riksbank, unpublished

UIPus deviations from UIP, Euro Dollar
UIPus=(i3–Usi3u)*0.25%–PCH(Euust+1)
i3, Usi3u see above, Euus see below
PCH per cent(al) change, quarters

Euus SEK/USD
quarterly average as from 1960 up to 1967
end of month as from 1968
source: Riksbank, unpublished

Eude SEK/100 DM
month average as from 1970 up to 1977
end of month as from 1978
source: Riksbank, unpublished

Financial Stocks and Reserve Ratios (end of Quarter, MKR).

Rp the public's holding of currency
source: QR and SY

Rt the total amount of currency in circulation
source: QR and SY

Rb bank's holding of notes and their (gross) claims on the Riksbank and the NDO
Rb =Rb1+Bdrb+Rdbg as from 1961 up to 1966
=Rb1+Bdrb+Rdbg+Kkmse as from 1967
Rb1 bank's holding of bank–notes
Rb1 =Rt–Rp
Rt, Rp see above
Bdrb bank's free deposits in the Riksbank
source: QR and SY

Rdbg bank's (gross) claims on the NDO
Rdbg=Rdcbg+Rdpbg
Rdcbg commercial bank's claims on the NDO
Rdpbg the Postal Banks claims on the NDO as from 1974
source: Riksbank, Financial Markets Department, unpublished
Kkmse bank's stipulated deposits in the Riksbank
source: QR and SY

Rbb bank's debts to the Riksbank and the NDO
Rbb=Blrb+Rlbg
Blrb bank's borrowing from the Riksbank, as from 1988 tender borrowing ("anbudsupplåning") is also included
source: Riksbank, 1961–66 unpublished series from the Financial Markets Department, as from 1967 published in QR and SY

Rlbg	Banks borrowing from the NDO
Rlbg	=Rlcbg+Rlpbg
Rlcbg	commercial bank's borrowing from the NDO
Rlcbg	=Rdcbg–Rncbg
Rdcbg	see above
Rncbg	commercial bank's net borrowing from the NDO
Rlpbg	the Postal Bank's borrowing from the NDO
Rlpbg	=Rdpbg–Rnpbg
Rdpbg	see above
Rnpbg	the Postal Bank's net borrowing fromthe NDo
source:	Riksbank, Financial Markets Department, unpublished

R monetary base
R=Rp+Rb
Rp, Rb see above

Ra adjusted monetary base
R=Rp+Rb–Rbb
Rp, Rb see above

Kr cash reserve ratio, required, all banks
Kr =Krbc*Dcb/D as from 1969:3 up to 1980:4
=Kr2 as from 1981

Krcb chash reserve ratio, required, commercial banks
Dcb, D see list
Kr2 cash reserve ratio, required, all banks
source: SY, QR

Ka cash reserve ratio, actual
Ka=Rb/D
Rb see above, D see below

Do "ordinary deposits": deposits from the public, in SEK excl. special deposits
Do =Dosf–Df as from 61 up to 68:3
=Dosf–Df–Ds as from 68:4

Dosf general public bank deposits in Swedish and foreign

currency, as from 1979 interest on deposits for current year credited in December, previously in January, the following year.
source: FI, compiled by the Riksbank

Df, Ds see below

Ds general public special deposits, in SEK
Ds =Dscb+Dsfb as from 1968:4 up to 69:4
=Dscb+Dsfb+Dspb as from 70 up to 71:4
=Dscb+Dsfb+Dspb+Dssb as from 72 up to 74:1
=Dscb+Dsfb+Dssb as from 74:2

Ds___ special deposits in:
cb commercial banks
fb co–operative banks
pb Postal Bank
source: FI
sp savings banks
calculated from the annual statistics of special deposits in all savings banks and from the quarterly statistics of special deposits in the largest savings banks
source: SY, FI

Dc general public holdings of certificates of deposits in SEK
source: FI, compiled by the Riksbank

D bank deposits made by the public, in SEK
D=Do+Ds+Dc
Do, Ds, Dc see above

Df bank deposits made by the public, in foreign currency
Df=Dfcb+Dfsb
Dfcb commercial bank's deposits in foreign currency
source: SY and unpublished material from the Riksbank
Dfsb savings bank's deposits in foreign currency
source: SY and unpublished material from the Riksbank

Dt national saving
source: Bank Inspection, monthly report

Btd treasury discount notes ("statsskuldsväxlar")
source: FI, compiled by the Riksbank

Strg borrowing limit where the penalty rate is applied in SEK million for all banks
source: Riksbank, unpublished

M3X money supply
M3X=Rp+Do
Rp, Do see above

LIQ money supply
LIQ=M3X+Ds+Dc+Dt+Btd
M3X, Ds, Dc, Dt, Btd see above

Lt total bank lendings to the public, in SEK and in foreign currency
source: FI, compiled by the Riksbank

Lt___ total bank lendings to the public, in SEK and in foreign currency from:
- cb commercial banks
  source: SY
- fb co–operative banks
  source: SY and AM
- pb Postal Bank
  source: SY and AM
- sb savings banks
  calculated from annual from statistics of total lending from all savings banks and quarterly statistics of total lending from the largest savings banks
  source: quarterly statistics on the largest savings banks lending; AM, annual statistics on all savings bank's lending; SY

Lf bank lending to the public, in foreign currency
source: SY

Lf___ banks lending to the public, in foreign currency from:
- cb commercial banks
  source: FI
- sb larger savings banks, (loans from small savings banks are negligable)
  source: FI

L bank lending to the public, in SEK
L=Lt–Lf
Lt, Lf see above

L___ banks lending to the public, in SEK from:
- cb commercial banks
- fb co–operative banks
- pb Postal Bank
- sb savings banks

Lcb =Ltcb as from 1961 up to 1973:3
=Ltcb–Lfcb as from 1973:4 up to 1986:4
=Lcb2 as from 1987
Ltcb, Lfcb see above
Lcb2 bank lending in SEK from commercial banks
source: FI

Lfb =Ltfb
Ltfb see above

Lpb =Ltpb
Ltpb see above

Lsb =Ltsb as from 1961 up to 1978:3
=Ltsb–Lfsb as from 1978:4 up to 1986:4
=Lsb2 as from 1987

Ltsb, Lfsb see above
Lsb2 bank loans in SEK from savings banks
source: FI

Lp lending potential (for explanation, see appendix B)
Lp =Lt–Lcb+Lpcb as from 1961 up to 1968
=Lpcb+Lpfb+Lppb+Lpsb as from 1969 up to 1974:1,
=Lpcb+Lpfb+Lpsb as from 1974:2 up to 1983:2,
=D as from 1983:3
Lt, Lcb, D see above, Lp___ se below

Lp___ lending potential:
cb commercial banks
fb co–operative banks
pb Postal Bank
sp savings banks

Lpcb=(Likcbf–Likcbk)*Dcb+Lcb
Likcbf actual liquidity ratio, commercial banks
Likcbk required liquidity ratio, commercial banks
source: Riksbank, unpublished monthly report
Dcb, Lcb see above

Lpfb=2/3*(Dfb–Dfb.1)+Lfb.1 as from 69:1 up to 71:4
=(Likfbf–Likfbk)*Dfb+Lfb as from 72:1 up to 83:2
Dfb, Lfb see above

Likfbf actual liquidity ratio, co–operative banks
Likfbk required liquidity ratio, co–operative banks
source: Riksbank, unpublished monthly report

Lppb=1/3*(Dpb–Dpb.1)+Lpb.1+Zdlnpb as from 69:3 up to 71:4
=(Likfpb–27)/100*Dpb+Lpb as from 1972
Dpb, Lpb see above
Zdlnpb change in lending against mortage in new housing constructions
source: Riksbank, unpublished internal report containing calculations of the liquidity ratio
Likfpb actual liquidity ratio, the Postal Bank
source: Riksbank, unpublished monthly report

Lpsb=1/3*(Dsb–Dsb.1)+Lsb.1+Zdlnsb as from 69:1 up to 71:4
=(Liksbf–Liksbk)*Dsb+Lsb as from 1972
Dsb,Lsb see above
Zdlnsb change in lending against mortage in new housing constructions
source: Riksbank, unpublished internal report containing calculations of the liquidity ratio
Liksbf actual liquidity ratio, savings banks
Liksbk required liquidity ratio, savings banks
source: Riksbank, unpublished monthly report

Δr liquidity ratio equivalent, required (for explanation, see appendix B)
Δr=(D–Lp)/D
D, Lp see above

la liquidity ratio equivalent, actual (for explanation, see appendix B)
la=(D–L)/D
D, L see above

Production, Prices et c. (End of Quarter)

Ym industrial production (ISIC 2+3)
source: SM series I

Pp producer price index
Pp =Pp49 as from 1960 up to 1965
=Pp68 as from 1966
Pp49 wholesale price index
source: AM
Pp68 producer price index, industrial output (ISIC 2+3)
source: SM, series P

Pc consumer price index, quarterly average
source: AM

Pcl consumer price index, end of quarter
source: AM

___pcl consumer price index, end of quarter in:

Us U S A
De Germany
Gb Great Britain
No Norway
Dk Denmark
Fr France
Be Belgium
Nl Netherlands
At Austria
Ch Switzerland
Ca Canada
It Italy
Jp Japan
Es Spain
Fi Finland
source: BIS

W15pcl "foreign" inflation
W15pcl =WUS*(PCHYA(USPCL))+WDE*(PCHYA(DEPCL))+
WGB*(PCHYA(GBPCL))+WNO*(PCHYA(NOPCL))+
WDK*(PCHYA(DKPCL))+WFR*(PCHYA(FRPCL))+
WBE*(PCHYA(BEPCL))+WFI*(PCHYA(FIPCL))+
WCH*(PCHYA(CHPCL))+WAT*(PCHYA(ATPCL))+
WES*(PCHYA(ESPCL))+WJP*(PCHYA(JPPCL))+
WIT*(PCHYA(ITPCL))+WNL*(PCHYA(NLPCL))+
WCA*(PCHYA(CAPCL))
W___, ___pcl see above

PCHYA per cental change, yearly

Pcdiff the difference between the Swedish inflation and the "foreign" inflation
Pcdiff =PCHYA(Pcl)–PCHYA(Uspcl) as from 1960 up to 73:2
=PCHYA(Pcl)–PCHYA(Depcl) as from 1973:3 to 77:3
=PCHYA(Pcl)–W15pcl as from 1977:4
Pcl, ___pcl, PCHYA see above

APPENDIX B. THE LIQUIDITY RATIO EQUIVALENT.

The regulations are described in "Kreditpolitiska medel", Ds Fi 1974:2, Lybeck (1975), Gottfries–Persson–Palmer (1989), and various government studies (SOU). The definitions of the liquidity ratios were altered several times, and before 1972 liquidity ratios applied only to commercial banks – regulations of other banks took a different form. Around 1972, the system became more homogeneous. In order to handle these complications, we define a "liquidity ratio equivalent": the fraction of deposits that banks could not lend without violating the regulations. (A similar procedure was used by Gottfries–Persson–Palmer (1989).)

Let the balance–sheet of a banking group i be

$$R_i^b - R_i^{bb} + B_i^b + L_i + R_i^1 = D_i,$$

where B_i^b is "liquid assets" in excess of net cash reserves $(R_i^b - R_i^{bb})$, and where R_i^1 is other assets and liabilities on the balance sheet, net. For each group of banks, we calculate the "lending potential", L^p, as the amount possible to lend without violating the regulations, given R^1. For banks that are subject to liquidity ratio requirements we can write

$$L_i^p = D_i - \ell_i^r (D_i + R_i^2) - R_i^1,$$

where ℓ_i^r stands for the required liquidity ratio and R_i^2 represents other assets (net) that are included in the denominator of the liquidity ratio. By definition

$$L_i = D_i - \ell_i^a (D_i + R_i^2) - R_i^1,$$

where ℓ_i^a is the actual liquidity ratio, so

$$L_i^p = L_i + (\ell_i^a - \ell_i^r)(D_i + R_i^2).$$

We use the approximation

$$L_i^p \approx L_i + (\ell_i^a - \ell_i^r) D_i,$$

which will be a good approximation provided that R^2 is not too important. As regards commercial banks, this formula is always used. For the period when there liquidity ratios had been abolished, we set $L_i^p = D_i$. This formula is also applicable to savings banks, as from 72:1, rural/co–operative banks as from 72:1, and the Postal Bank, 72:1–74:2.

Savings banks were subject to formal regulations up to 62:2; thereafter there were informal recommendations made by the Riksbank. Since we do not have data that allow us to specify these regulations and recommendations, we simply assume that these were binding. Hence we set $L^p = L$ for savings banks 1960–1968. During the period 69:1–71:4, placement ratios applied to savings banks: 2/3 of the increase in the portfolio

had to be invested in "priority assets", that is, liquid assets according to the liquidity ratio requirements, and lending against mortgage in new housing constructions. (This was not the same as priority construction credits.) Let L^n stand for lending against mortgage in new housing constructions and take it as given. Then potential loans are approximately

$$L^p \cong L_{-1} + (1-p^r)\,\Delta D + \Delta L^n.$$

where p^r is the placement ratio (here 2/3).

The *Postal Bank* was subject to the same regulations as the savings banks, and we define potential loans in the same way. For *agricultural associations*, there was a marginal liquidity ratio of 1/3 during the period 69:1–71:4, that is, the same as above, but not including L^n, and with $p^r=1/3$. We assume that there were binding recommendations for agricultural associations before 1969.

Now, define a required liquidity ratio equivalent for the whole banking system, ℓ^r, as:

$$\ell^r \equiv \frac{D - L^p}{D}.$$

A corresponding actual liquidity ratio equivalent is defined as

$$\ell^a \equiv \frac{D - L}{D}.$$

For these calculations we used D and L of the different banking groups (and L^n for 69:1–71:4 for savings banks and the postal bank), and required as well as actual liquidity ratios, which have been calculated by the Riksbank.

The advantage of this method is that the liquidity ratio equivalent is defined in the same way for the whole period although the specific regulations have changed.

APPENDIX C. DATA FOR NON–BANK INTERMEDIARIES (YEARLY).

All data refers to stocks at the end of the year.

Outstanding loans from mortgage institutions to the public are from various issues of the Riksbank's Statistical Yearbook, for the years 1961 through 1989.

Data on loans from (nation–wide) insurance companies to the public are constructed from the Riksbank's Statistical Yearbook for the period 1961–75 by summing policy loans, loans against mortgage and loans against other securities excepting foreign loans and loans to affiliated companies. For the years 1976–85 Credit Market Statistics from Statistics Sweden has been used, and for the years 1986–88 Statistical Reports on Deposits and Advances on the Credit Market, also from Statistics Sweden, has been used. For the year 1989 data is taken from Statistics Sweden, Statistical Report K12 9002, summing policy loans and direct loans to non–financial Swedish borrowers (including investment companies) in SEK and in foreign currency. It is assumed that lending in foreign currency was negligable.

Annual data on finance companies are available only from 1968. Data on loans and leasing from finance companies to the public are from Statistics Sweden, Statistical Report K 1984:5 for the period 1968–79, and from the Riksbank's Statistical Yearbook for the period 1980–89. The quantitative analysis of loans from finance companies is complicated by the fact that the list of registered finance companies are subject to frequent changes (a financing firm is registered as a finance company if assets exceed 10 million SEK, or if one of its owners is a bank). This means that data on loans from registered finance companies tend to exaggerate the credit expansion. Statistics Sweden therefore publish data for a group of larger finance companies. During the years 1981 through 1988, the mean expansion of total credit extended by registered finance companies was 21%, with a high of 44% in 1983 and a low of 6% in 1984. For the same

years, the mean expansion of credit from the "control group" was 15%, with a high of 30% in 1983. In 1984, credit granted by the control group increased by 4%. The "control group" accounted for 90% of outstanding loans and leasing in 1985 (see Statistical Report K34 1987:4, Statistics Sweden).

Using unpublished data from the Riksbank on loans and leasing in foreign currency extended by business credit institutions and finance companies, direct credit in SEK is obtained for these intermediaries.

Total private debt includes most types of credit granted households and non–financial business: direct credit (loans), trade credit, open market loans (bonds and commercial paper), denominated in SEK as well as foreign currencies. Loans within the household sector are not included. Nominal series are deflated by CPI.

DIAGRAM 3:1

DOLLAR AND D-MARK EXCHANGE RATE

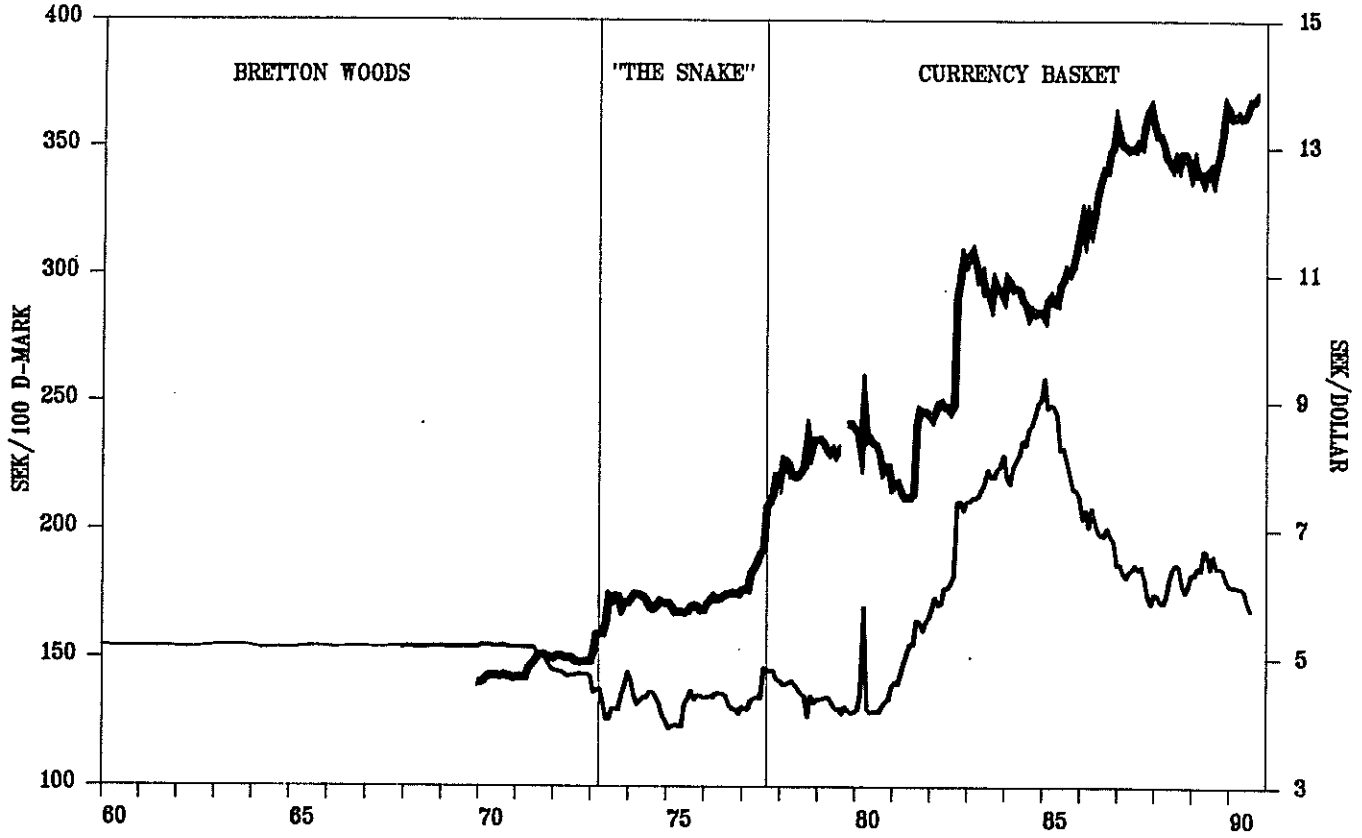


DIAGRAM: GEDD

DIAGRAM 3:2

DEVIATIONS FROM CIP

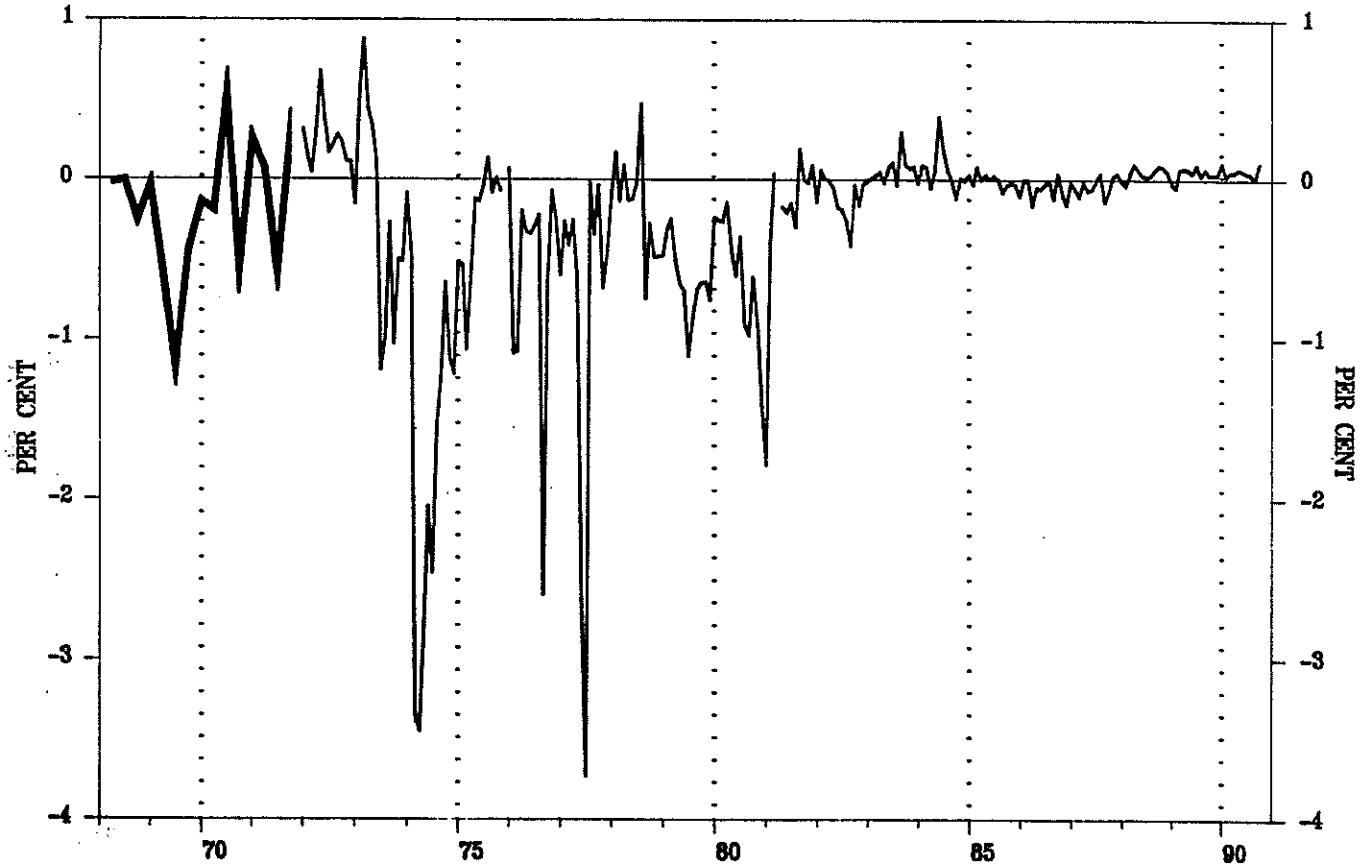


DIAGRAM: GCIP

SWEDISH INTEREST RATES LESS THE EURO DOLLAR INT. RATE (ACTUAL RETURN) LESS THE FORWARD PREMIUM

DIAGRAM 3:3 INTEREST RATES, THE FORWARD PREMIUM AND DEVIATIONS FROM CIP

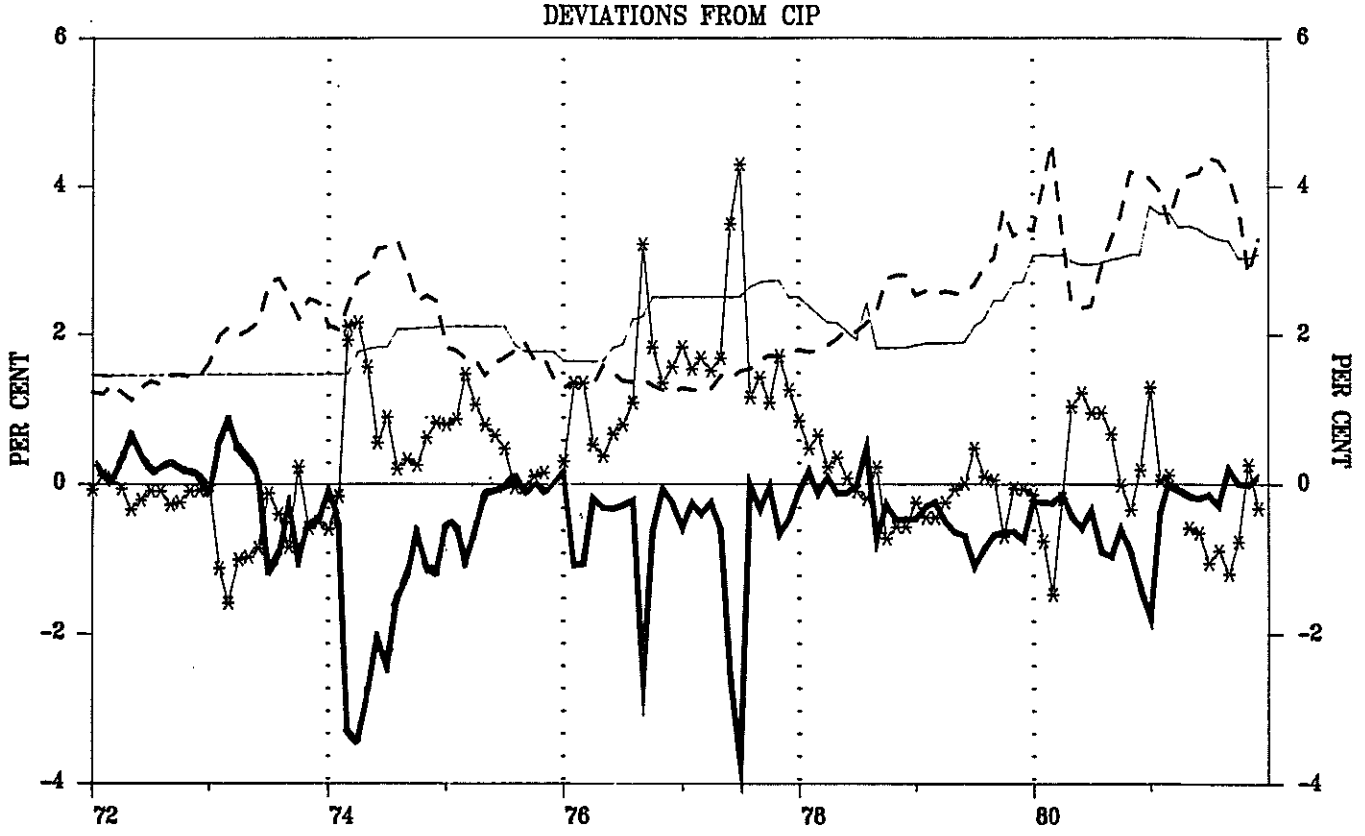


DIAGRAM: GCIPR INTEREST RATES: ACTUAL RETURN

DIAGRAM 3:4 SWEDISH AND FOREIGN INTEREST RATES

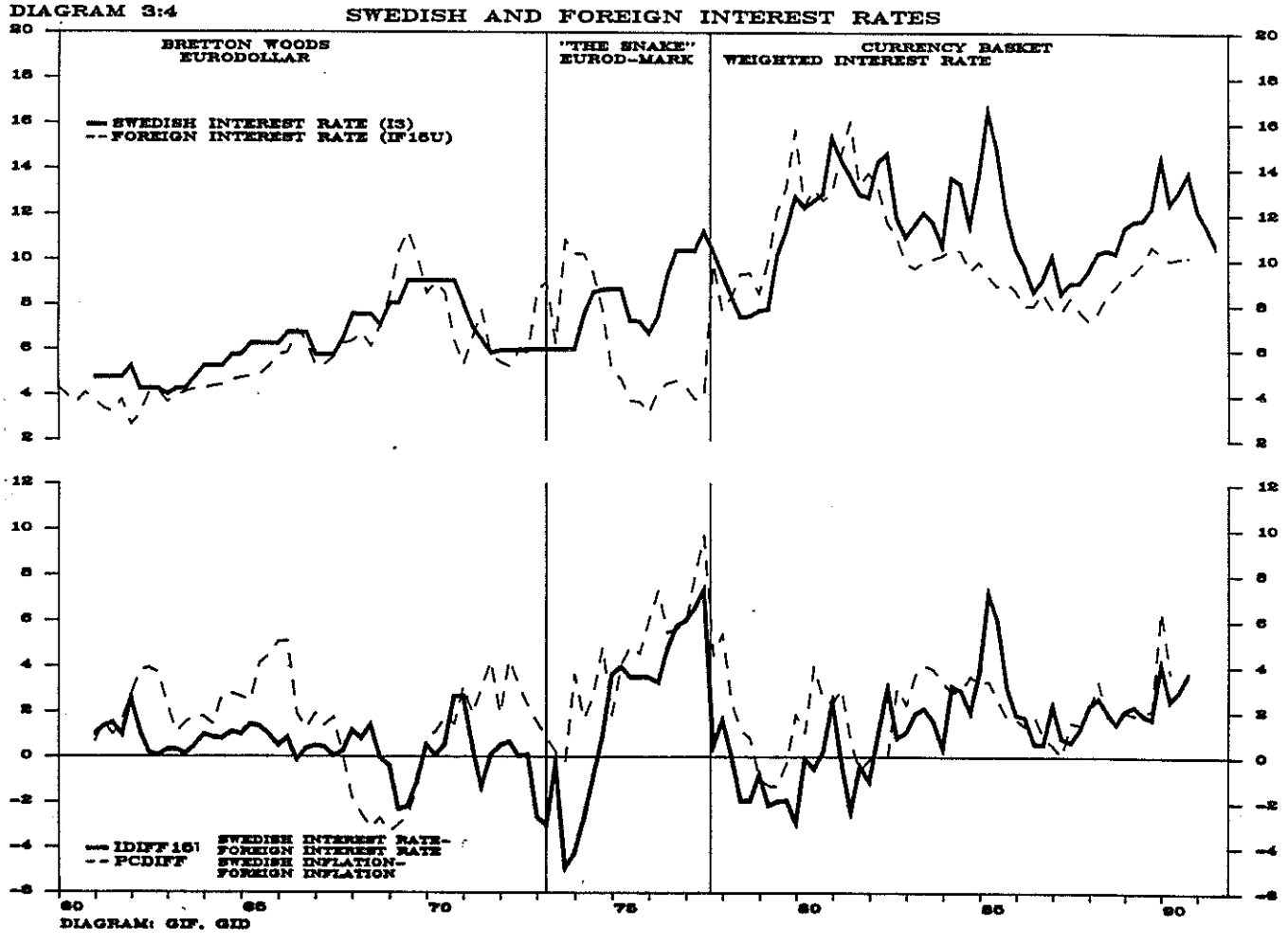


DIAGRAM: GIF, GID

DIAGRAM 3:5 SWEDISH AND FOREIGN REAL REALIZED INTEREST RATES

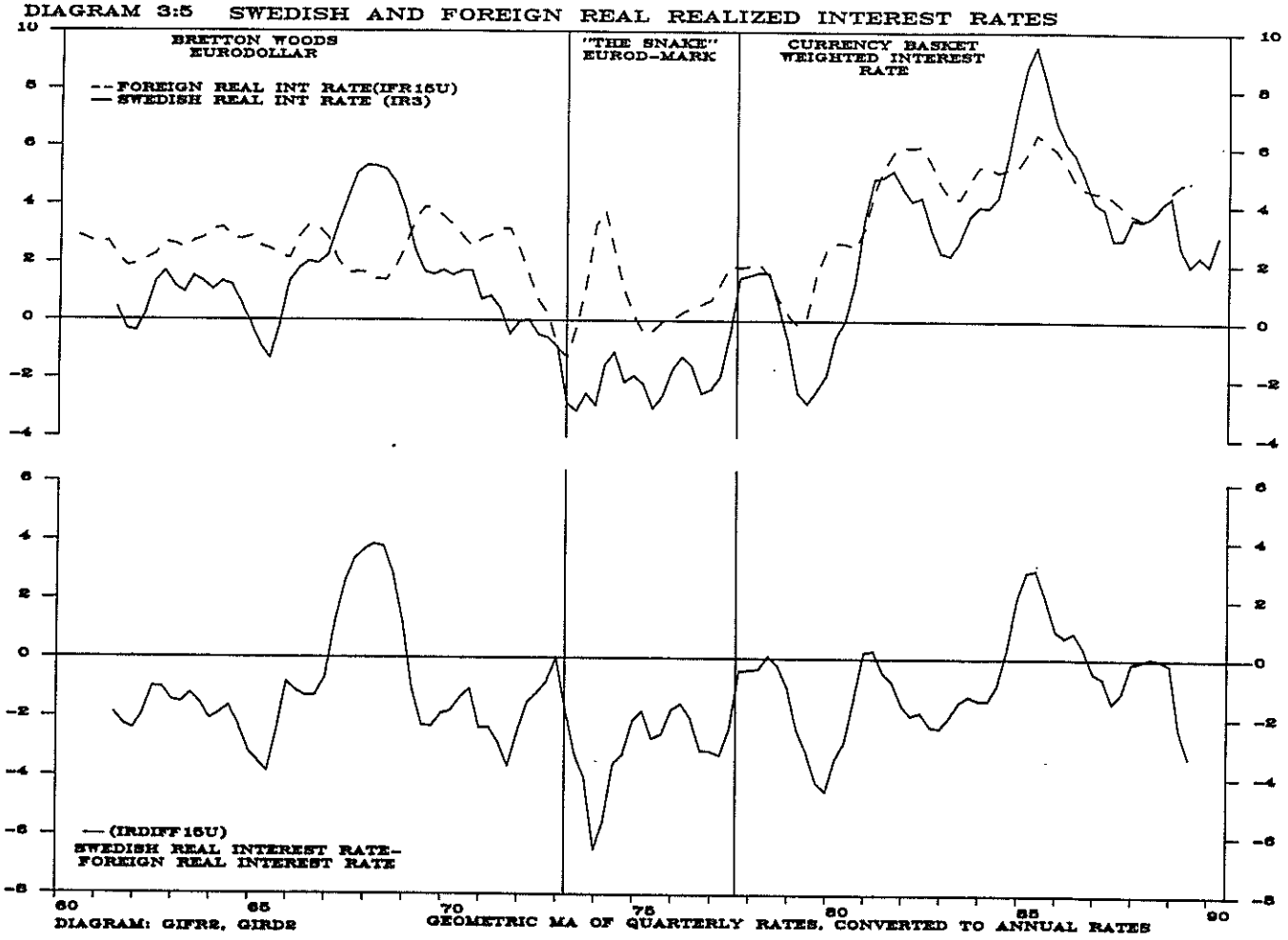


DIAGRAM: GIFR2, GIRD2

GEOMETRIC MA OF QUARTERLY RATES, CONVERTED TO ANNUAL RATES

DIAGRAM 3:6 INTEREST RATE DIFFERENTIAL AND REALIZED CHANGE IN THE EXCHANGE RATE, EURODOLLAR

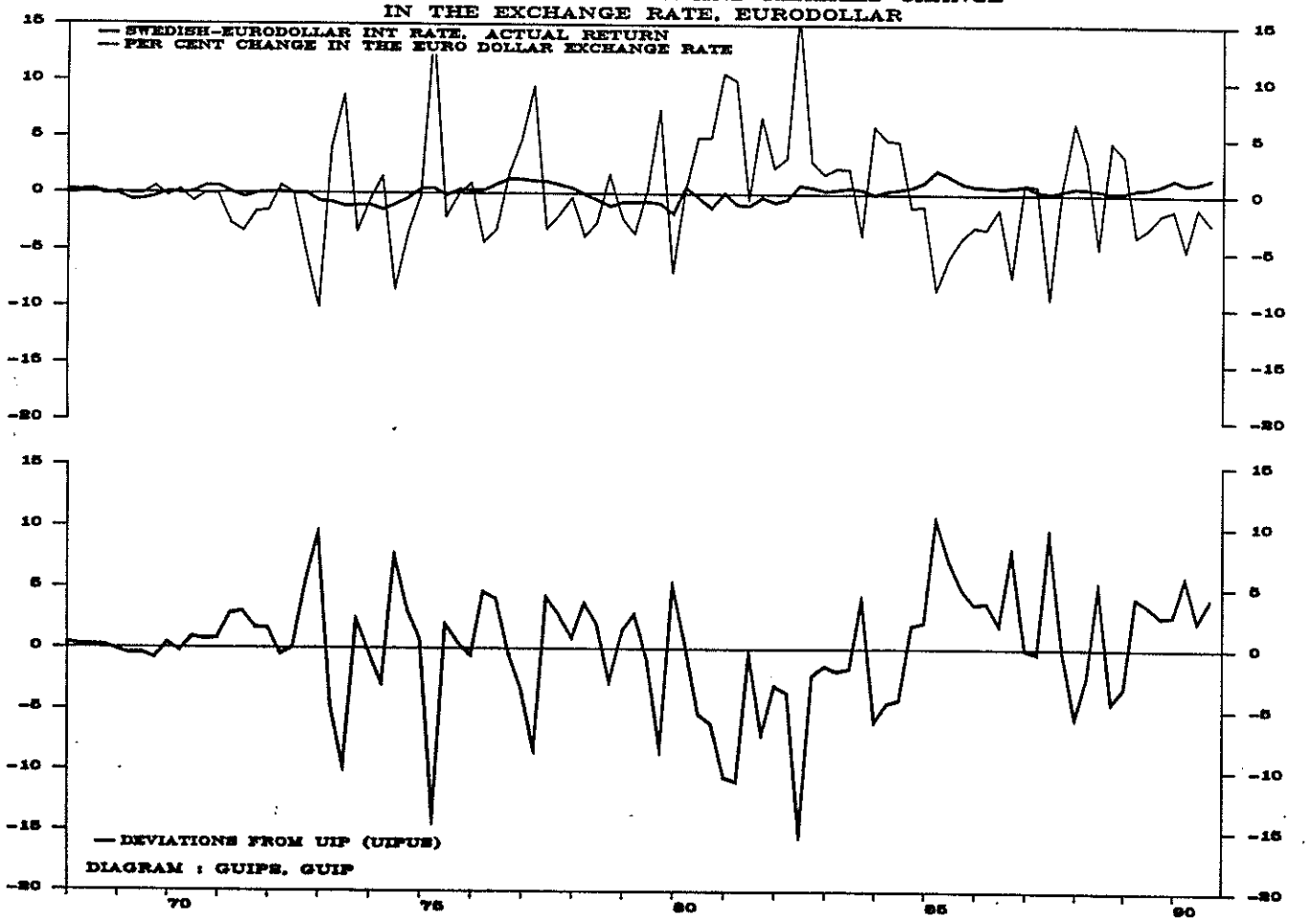
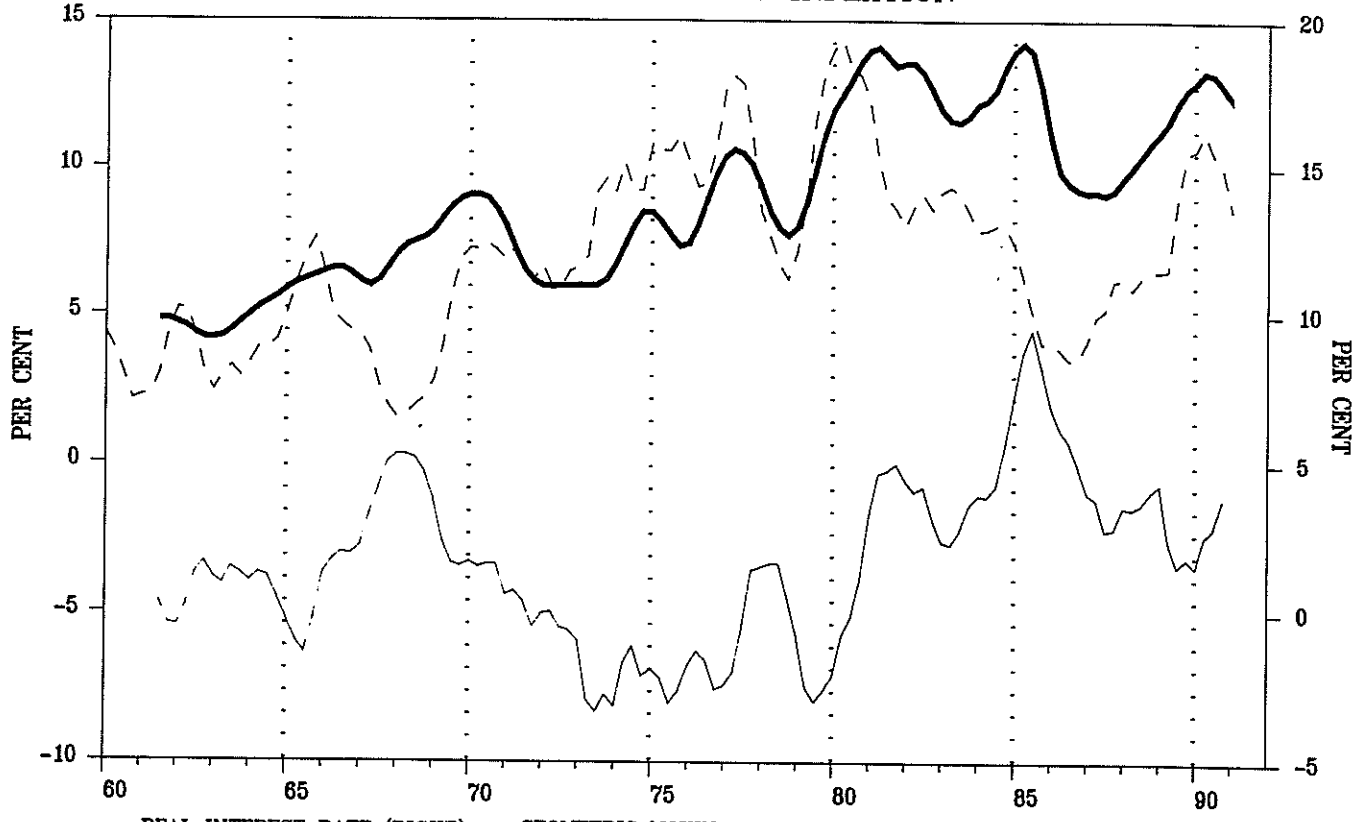


DIAGRAM : GUIPS, GUIP

DIAGRAM 4:1

INTEREST RATES AND INFLATION

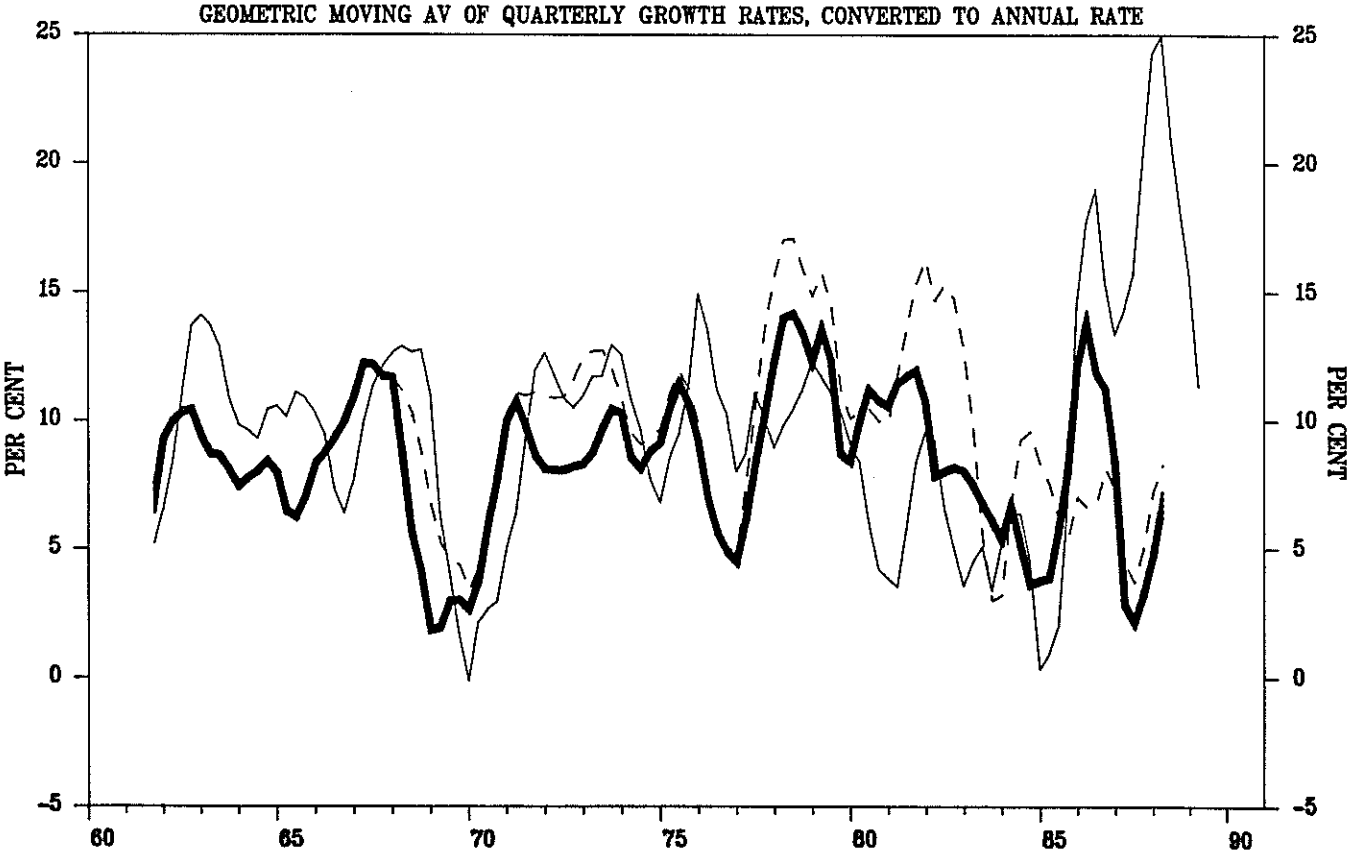


— REAL INTEREST RATE (RIGHT) GEOMETRIC MOVING AV
— NOMINAL INTEREST RATE (LEFT) GEOMETRIC MOVING AV OF ANNUAL RATES
-- INFLATION (LEFT) GEOMETRIC MOVING AV OF QUARTERLY GROWTH RATES, CONVERTED TO ANNUAL RATE
DIAGRAM: GI3MA

DIAGRAM 4:2

MONEY SUPPLY AND BANK LOANS

GEOMETRIC MOVING AV OF QUARTERLY GROWTH RATES, CONVERTED TO ANNUAL RATE



— MONEY SUPPLY (M3X) -- BROAD MONEY SUPPLY (LIQ) — BANK LOANS (L)
DIAGRAM : GM3XLL

DIAGRAM 4:3

REAL AND NOMINAL MONEY SUPPLY

GEOMETRIC MOVING AV OF QUARTERLY GROWTH RATES, CONVERTED TO ANNUAL RATE

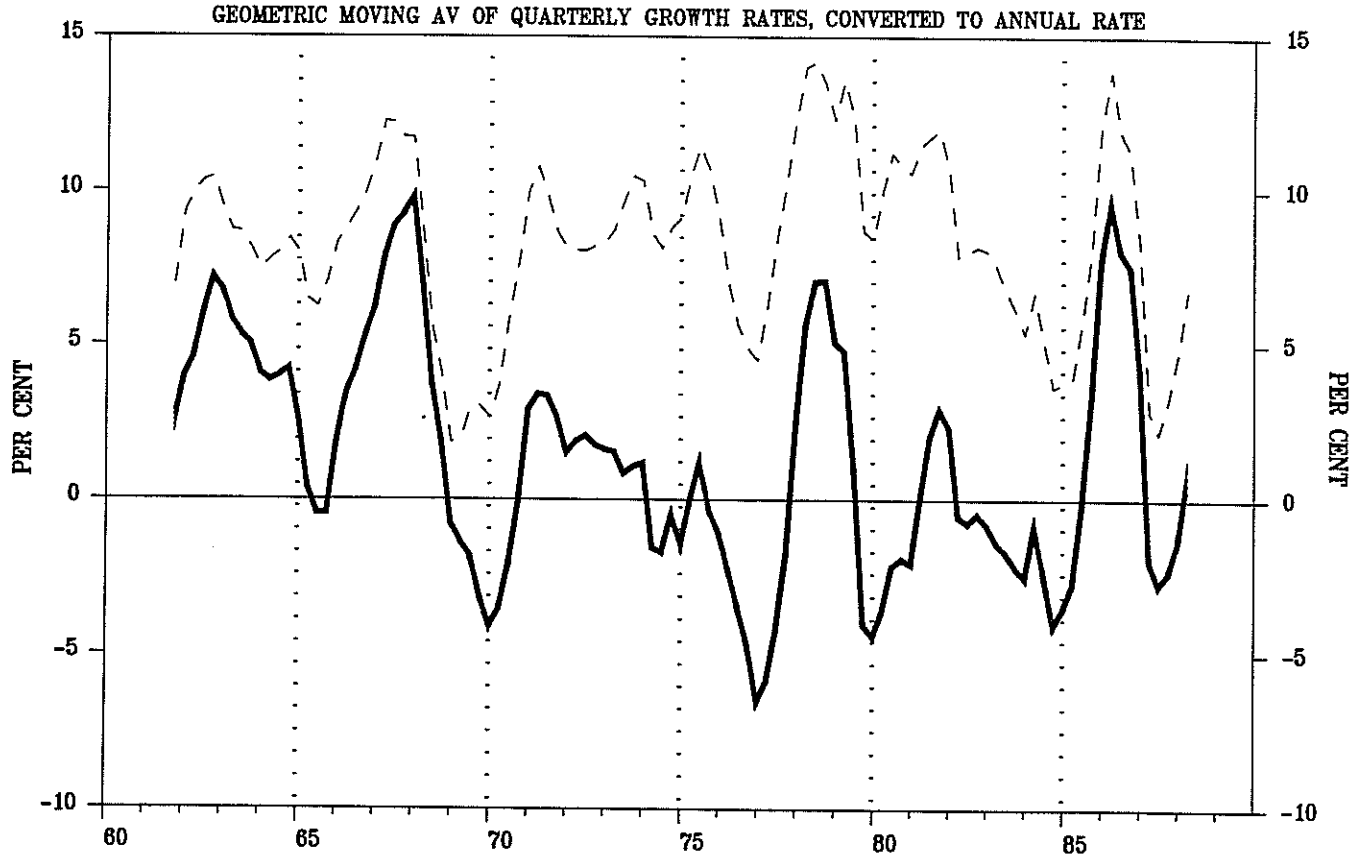


DIAGRAM : GM3X

DIAGRAM 4:4

REAL AND NOMINAL BANK LOANS

GEOMETRIC MOVING AV OF QUARTERLY GROWTH RATES, CONVERTED TO ANNUAL RATE

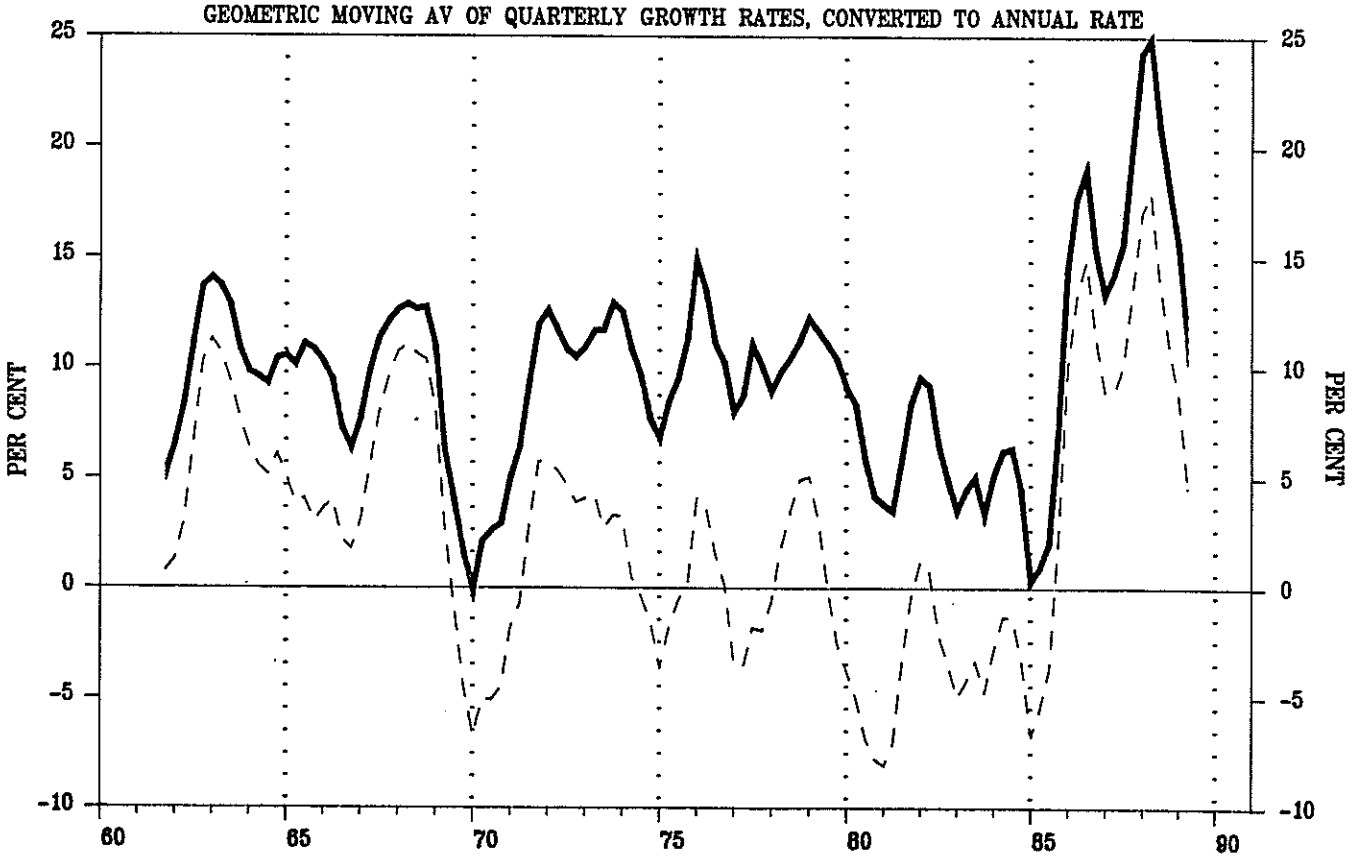
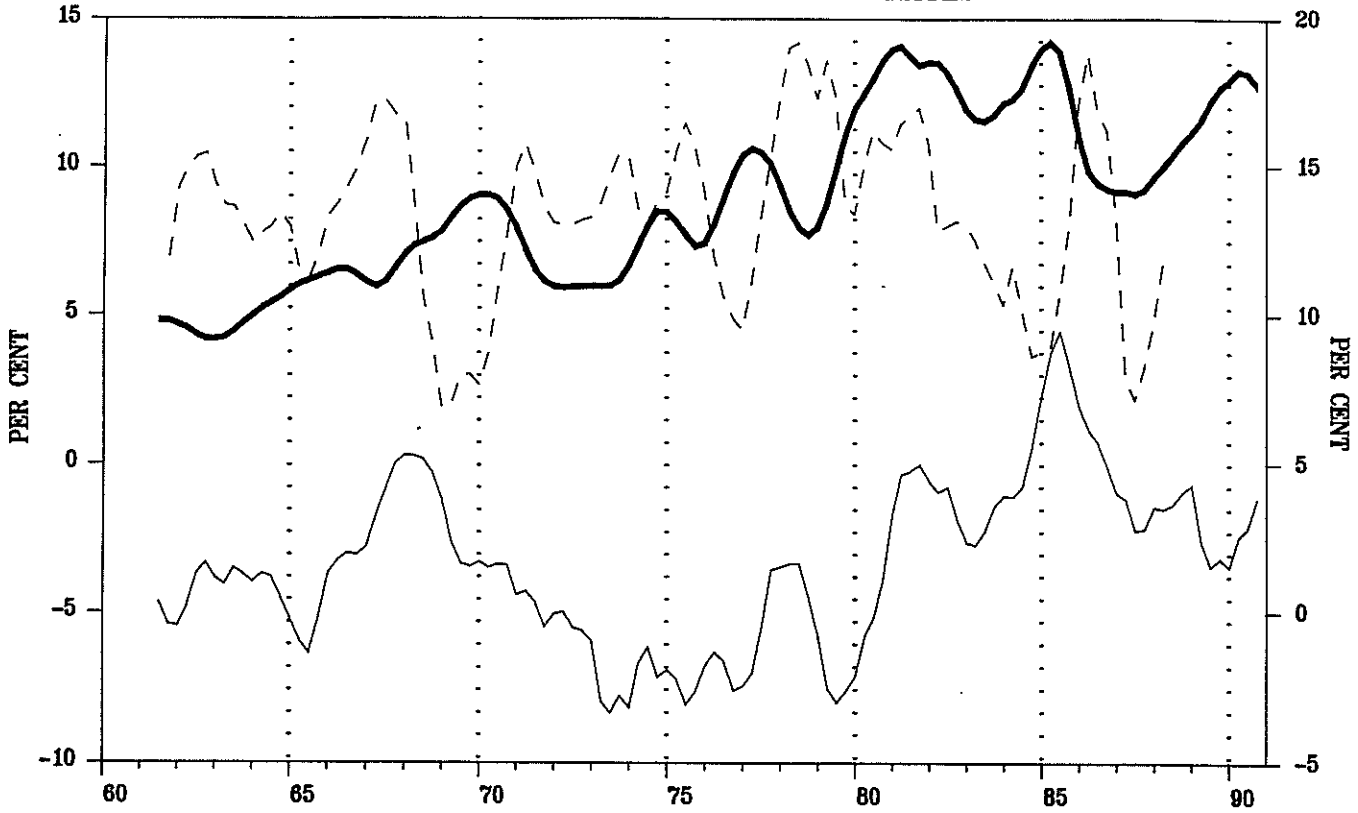


DIAGRAM : GLLR

DIAGRAM 4:5

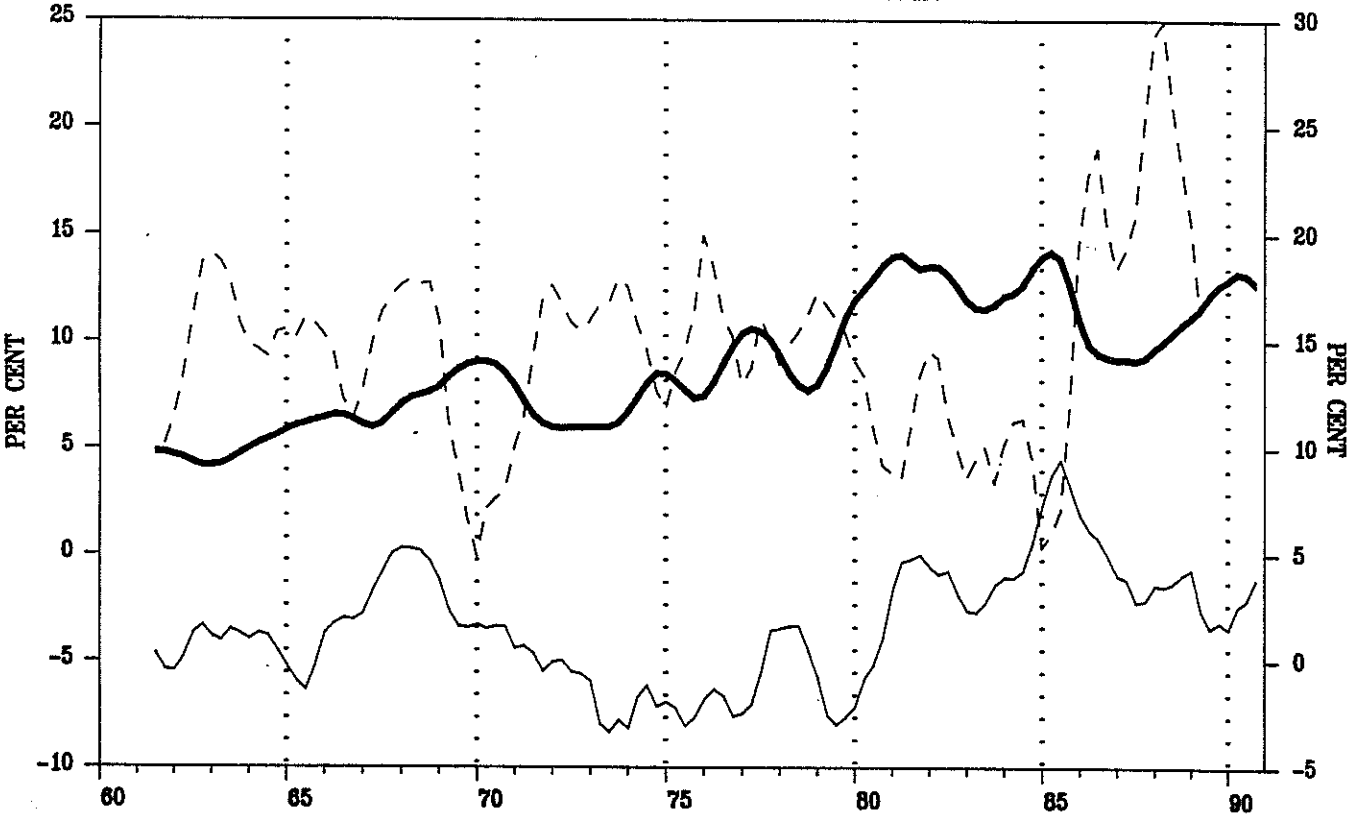
MONEY SUPPLY AND INTEREST RATES



— INTEREST RATE (I3) GEOMETRIC MOV AV OF ANNUAL GROWTH RATES
-- MONEY SUPPLY (M3X) GEOMETRIC MOV AV OF QUART GROWTH RATES, CONVERTED TO ANNUAL RATE
— REAL INTEREST RATE (IR3) GEOMETRIC MOV AV (RIGHT)
DIAGRAM : GMSI3

DIAGRAM 4:6

BANK LOANS AND INTEREST RATES



— NOM INTEREST RATE GEOMETRIC MOV AV OF ANNUAL RATES
-- BANK LOANS (L) GEOMETRIC MOV AV OF QUART GROWTH RATES, CONVERTED TO ANNUAL RATE
— REAL INTEREST RATE (IR3) GEOMETRIC MOV AV (RIGHT)
DIAGRAM : GLI3

DIAGRAM 4:7

INDUSTRIAL PRODUCTION, NOMINAL AND REAL INTEREST RATE

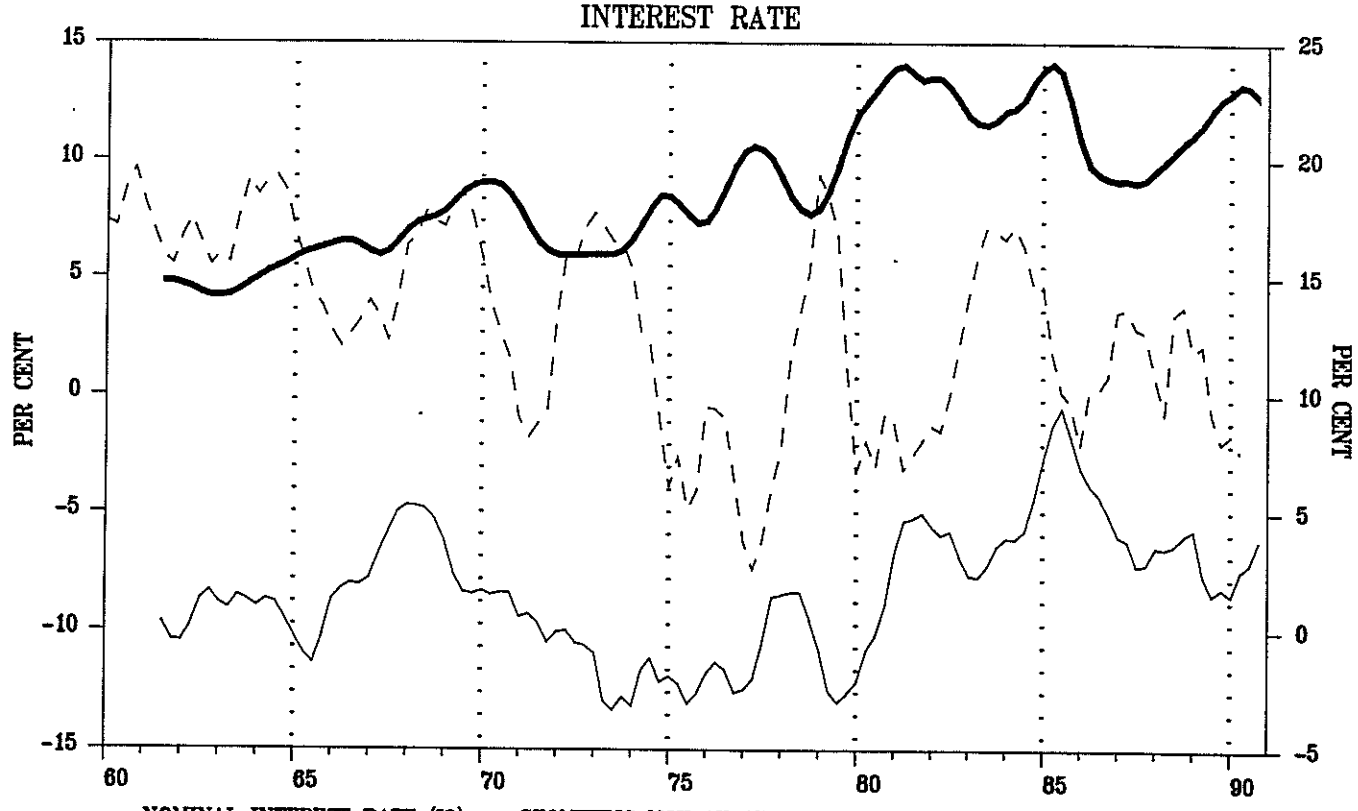


DIAGRAM: GYMI3

DIAGRAM 4:8

MONEY SUPPLY AND INDUSTRIAL PRODUCTION

GEOMETRIC MOVING AV OF QUARTERLY GROWTH RATES, CONVERTED TO ANNUAL RATE

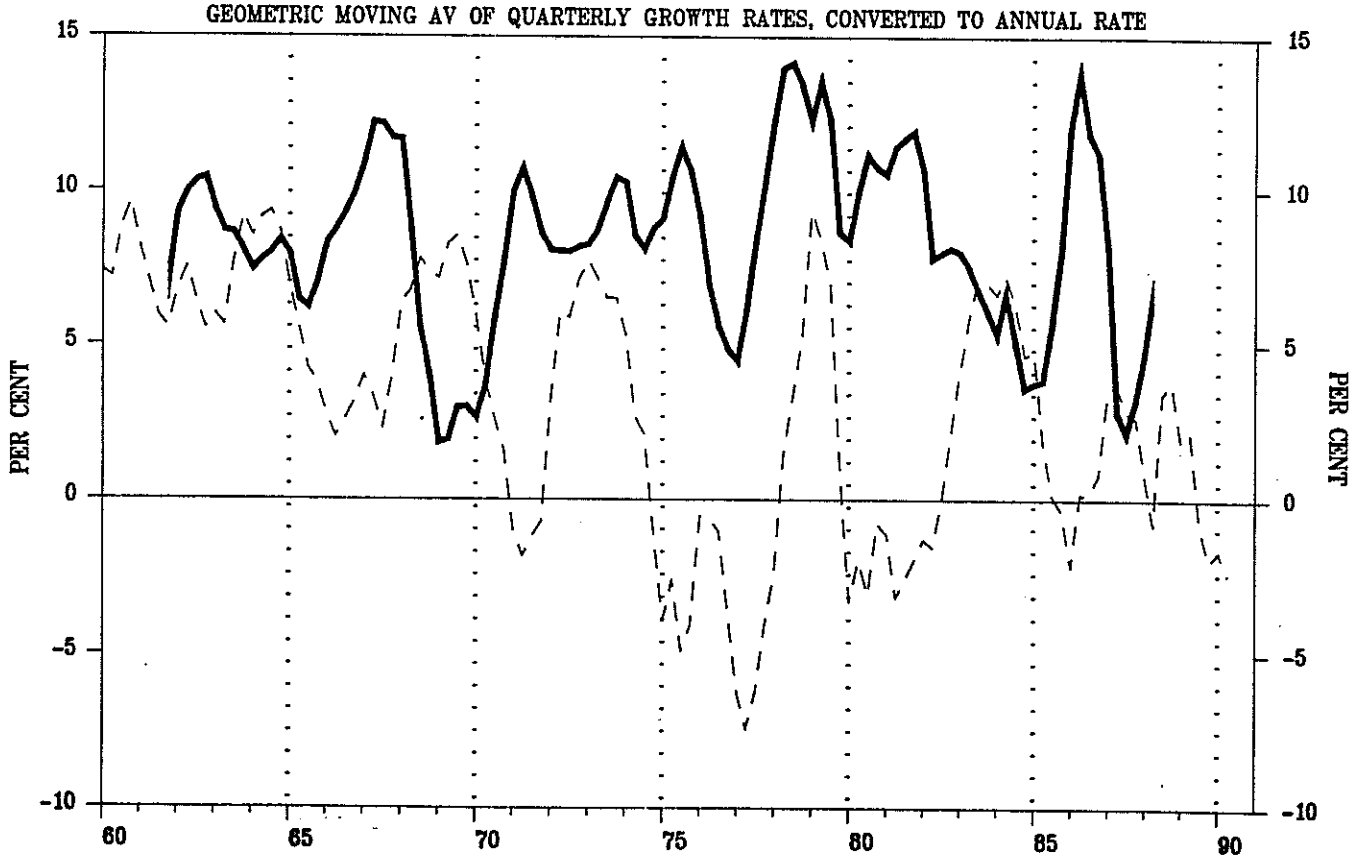


DIAGRAM : GMSY*

DIAGRAM 4:9 REAL MONEY SUPPLY AND INDUSTRIAL PRODUCTION

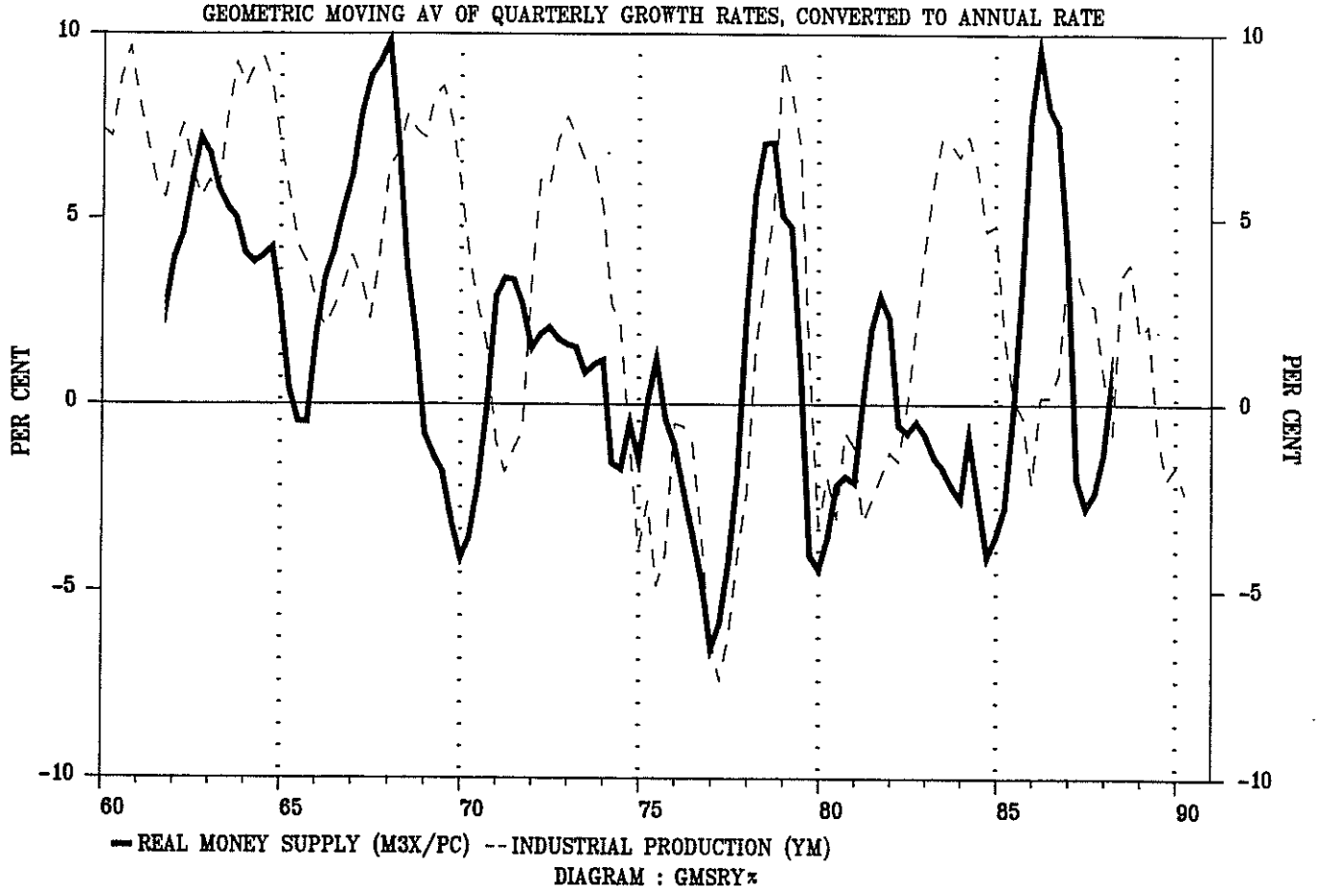


DIAGRAM 4:10 NOMINAL BANK LOANS AND INDUSTRIAL PRODUCTION

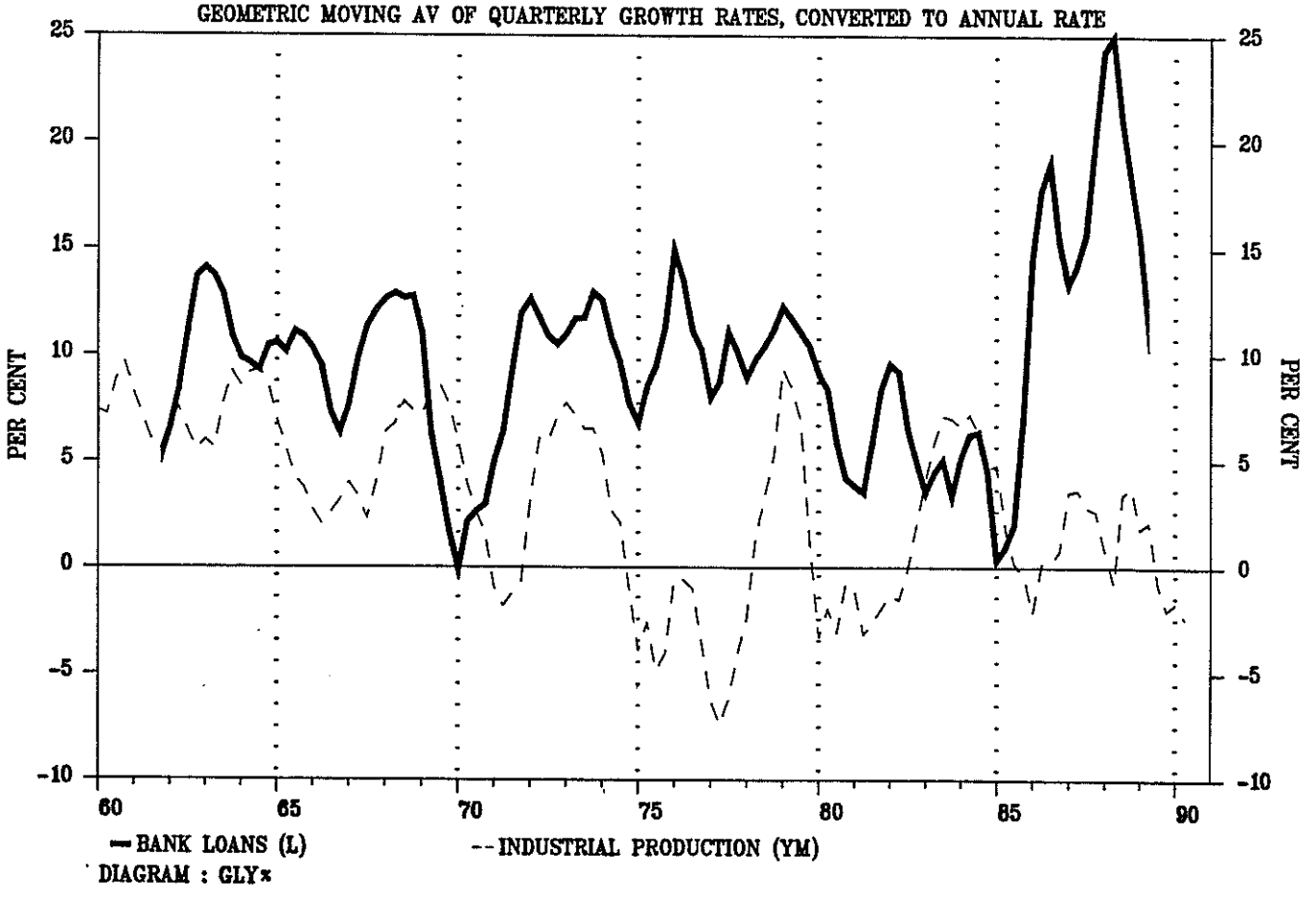


DIAGRAM 4:11

REAL BANK LOANS AND INDUSTRIAL PRODUCTION

GEOMETRIC MOVING AV OF QUARTERLY GROWTH RATES, CONVERTED TO ANNUAL RATE

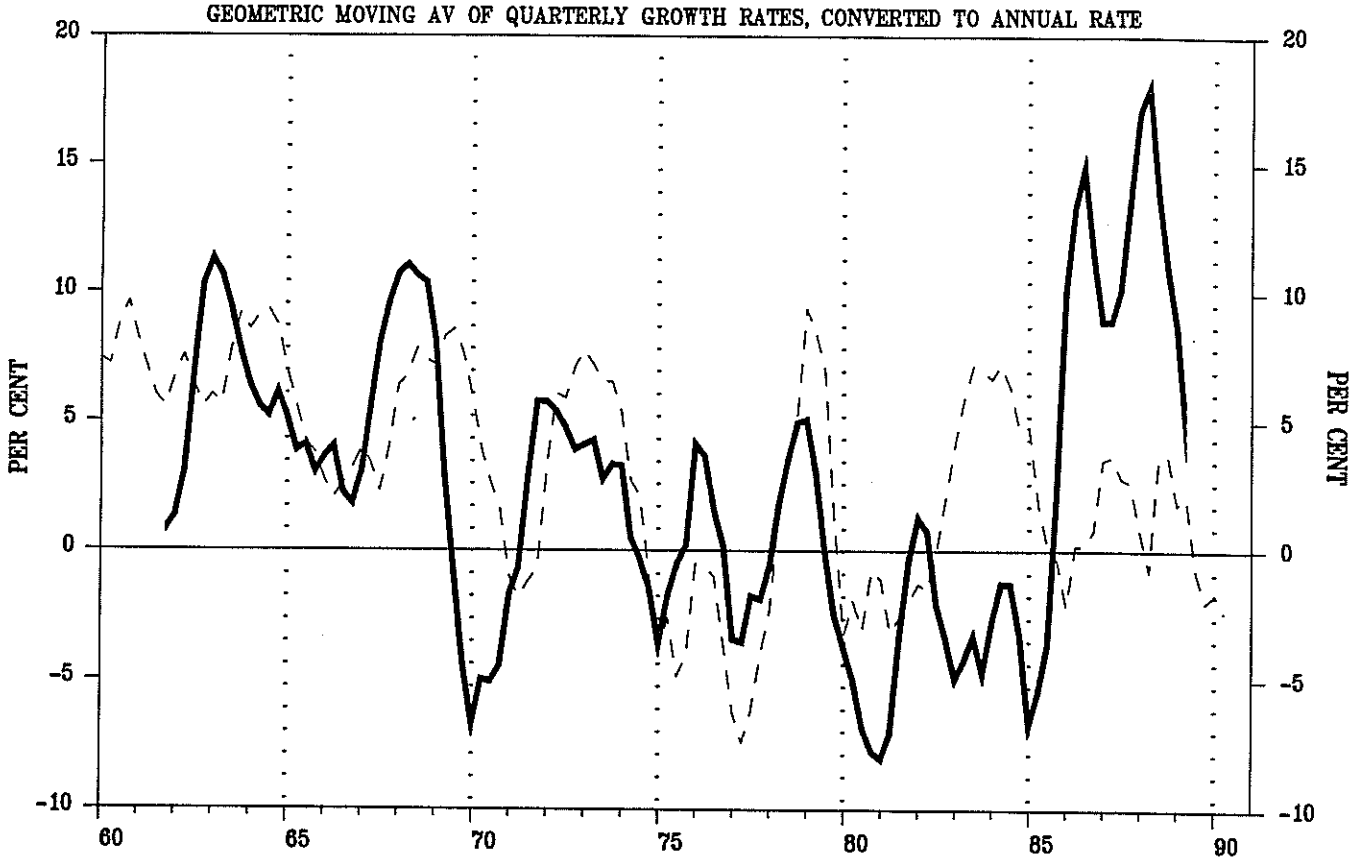


DIAGRAM : GLRY%

DIAGRAM 4:12

INFLATION AND MONEY SUPPLY

GEOMETRIC MOVING AV OF QUARTERLY GROWTH RATE, CONVERTED TO ANNUAL RATE

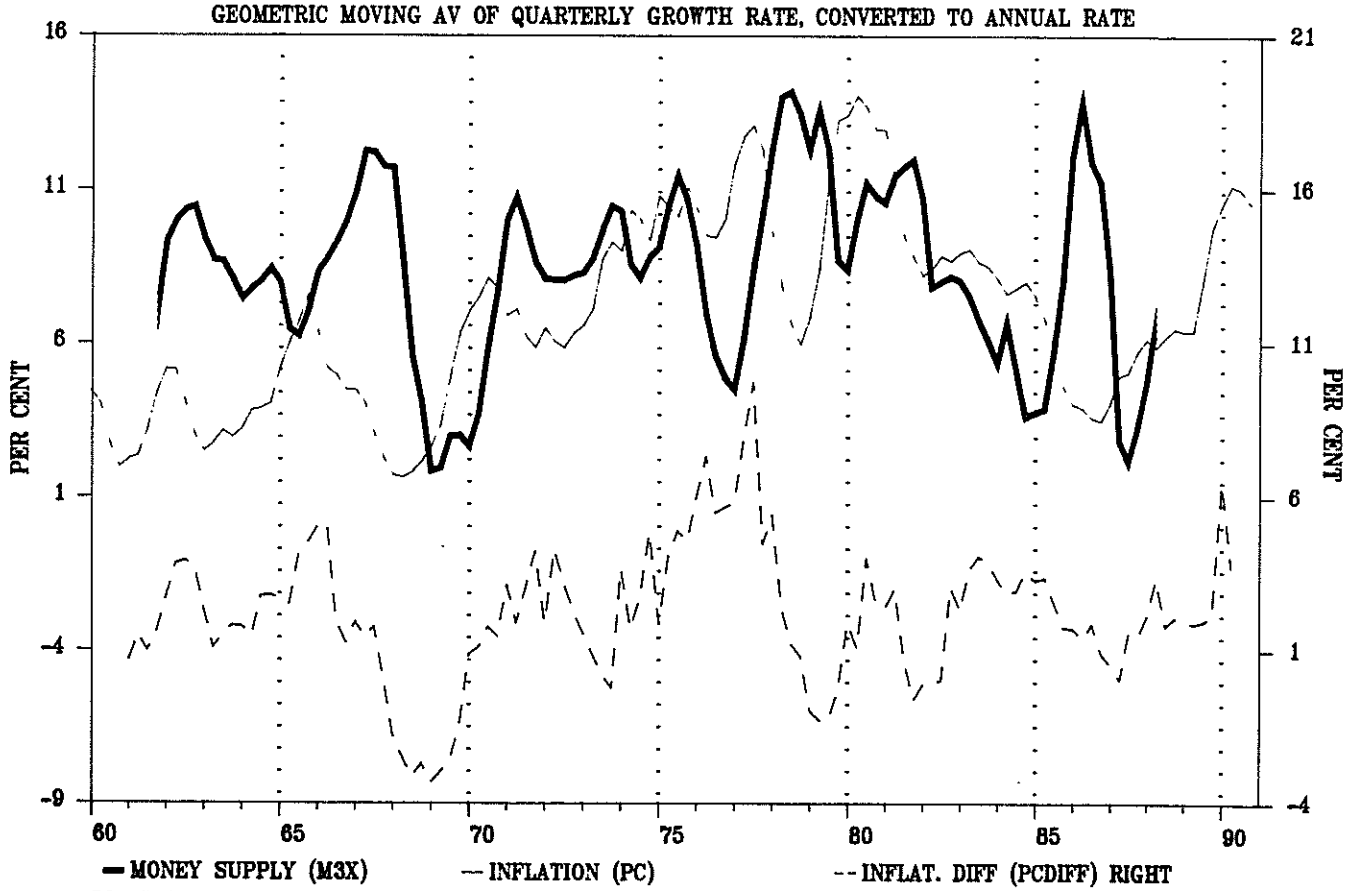
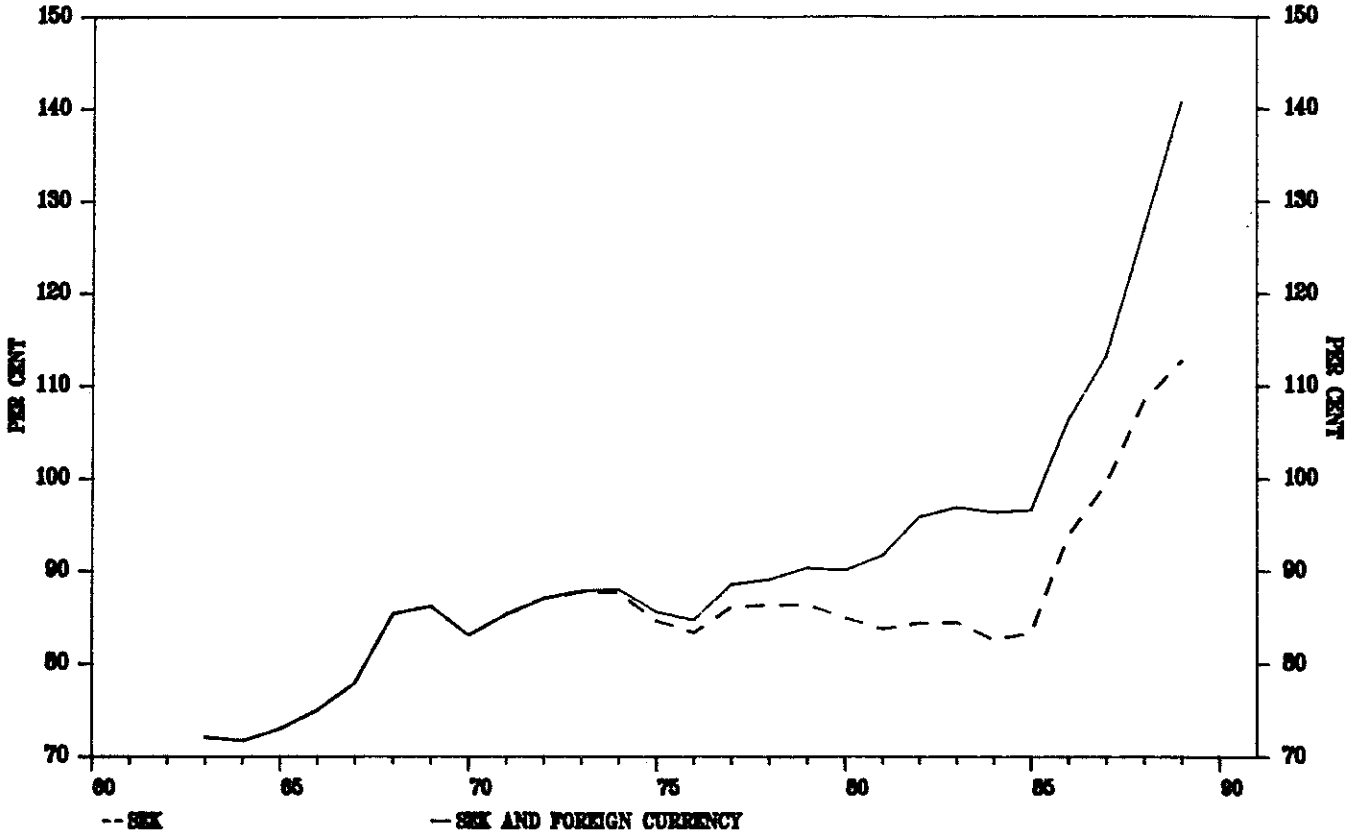


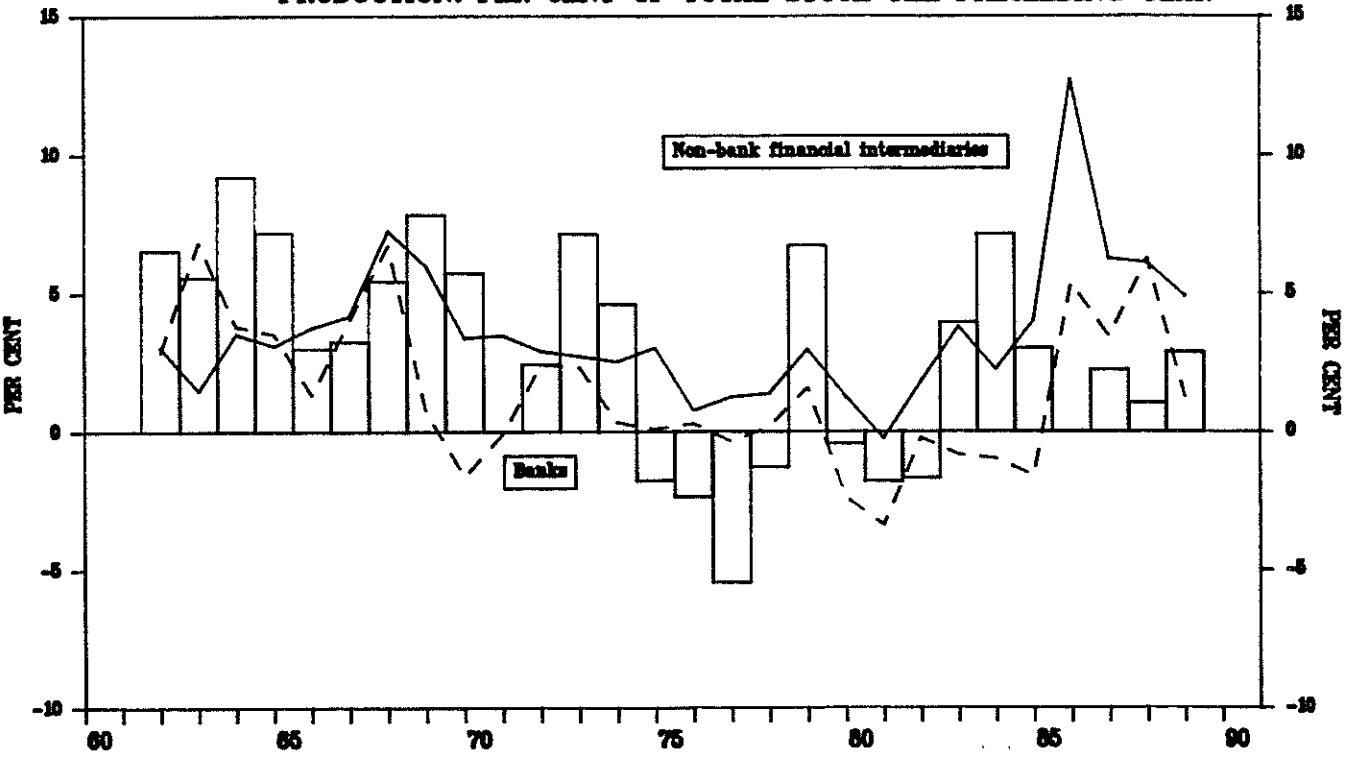
DIAGRAM : GMSPCD

DIAGRAM 5:1 INTERMEDIATED CREDIT RELATIVE TO GDP



BANKS AND OTHER INTERMEDIARIES, OUTSTANDING LOANS TO THE PUBLIC
DIAGRAM:ICSGDP

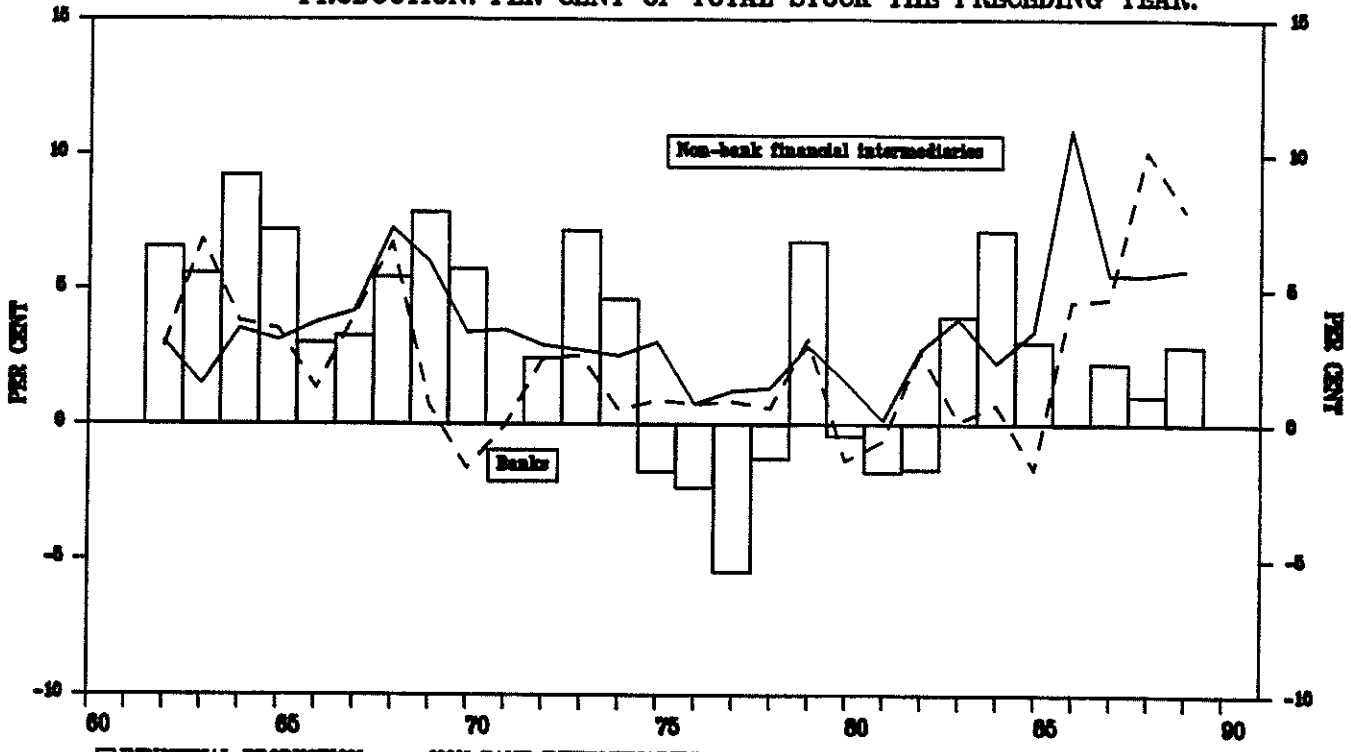
DIAGRAM 5:2 CHANGE IN REAL INTERMEDIATED CREDIT IN SEK AND INDUSTRIAL PRODUCTION. PER CENT OF TOTAL STOCK THE PRECEEDING YEAR



NOMINAL CREDIT HAS BEEN DEFLATED BY CPI.

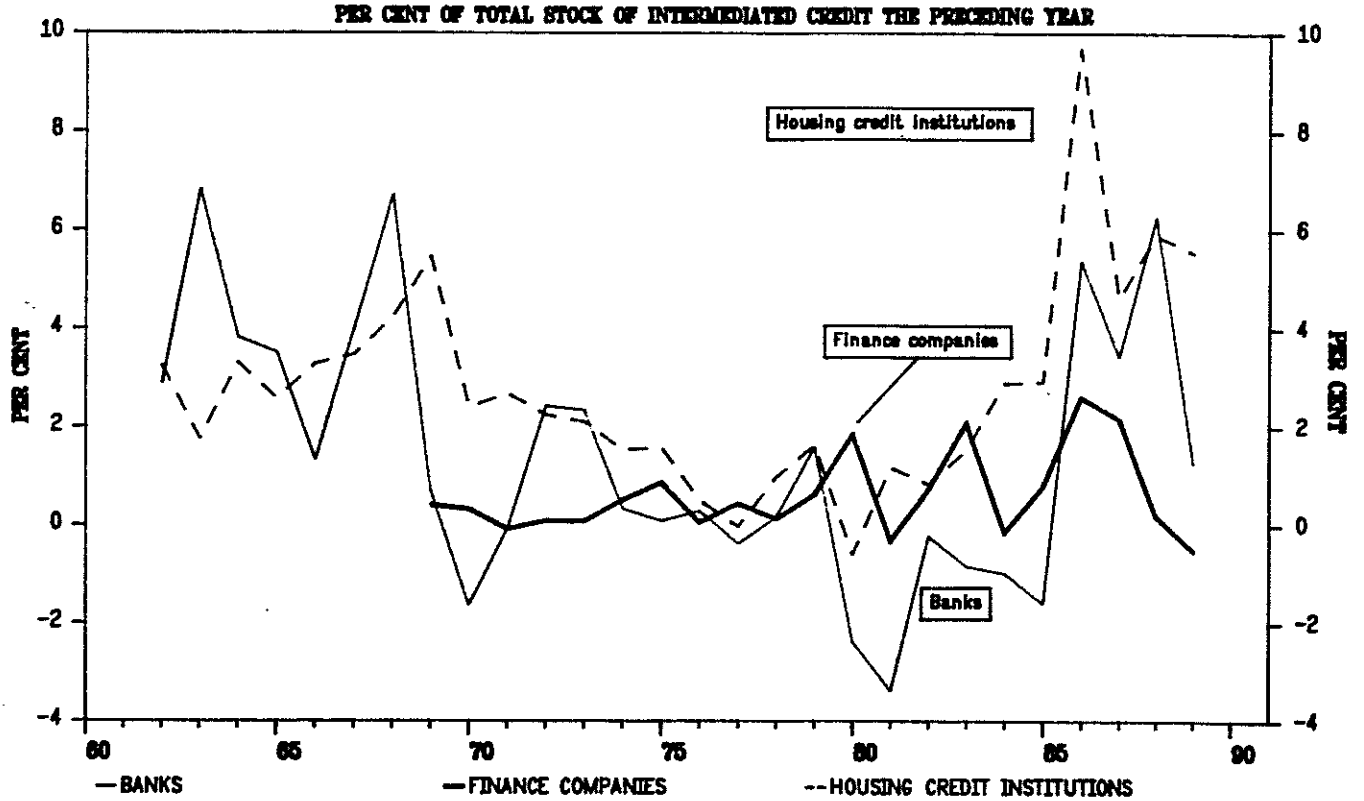
DIAGRAM:ILPO

DIAGRAM 5:3 CHANGE IN REAL INTERMEDIATED CREDIT & INDUSTRIAL PRODUCTION. PER CENT OF TOTAL STOCK THE PRECEDING YEAR.



□INDUSTRIAL PRODUCTION —NON-BANK INTERMEDIARIES --BANKS
NOMINAL CREDIT DEFLATED BY CPI. LOANS IN FOREIGN CURRENCY INCLUDED
DIAGRAM:ILPOX

DIAGRAM 5:4 CHANGE IN REAL INTERMEDIATED CREDIT IN SEK TO THE PUBLIC
PER CENT OF TOTAL STOCK OF INTERMEDIATED CREDIT THE PRECEDING YEAR



—BANKS —FINANCE COMPANIES --HOUSING CREDIT INSTITUTIONS
NOMINAL CREDIT DEFLATED BY CPI

DIAGRAM:EQDRA

DIAGRAM 5:5 INDUSTRIAL PRODUCTION, REAL INTERMEDIATED CREDIT AND REAI TOTAL 'PRIVATE' DEBT

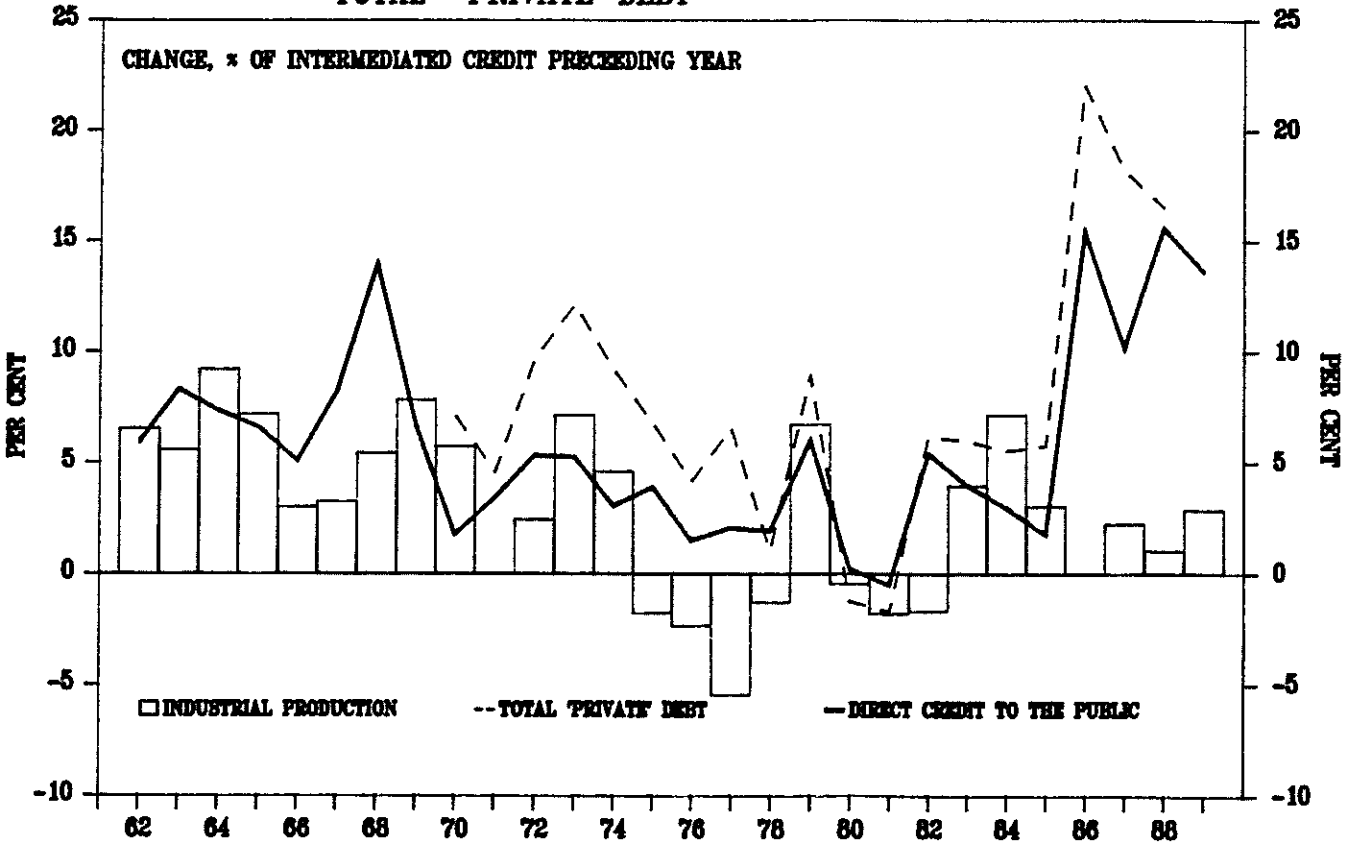


DIAGRAM:H&HDTR2

DIAGRAM 6:1

COMPONENTS OF THE MONETARY BASE

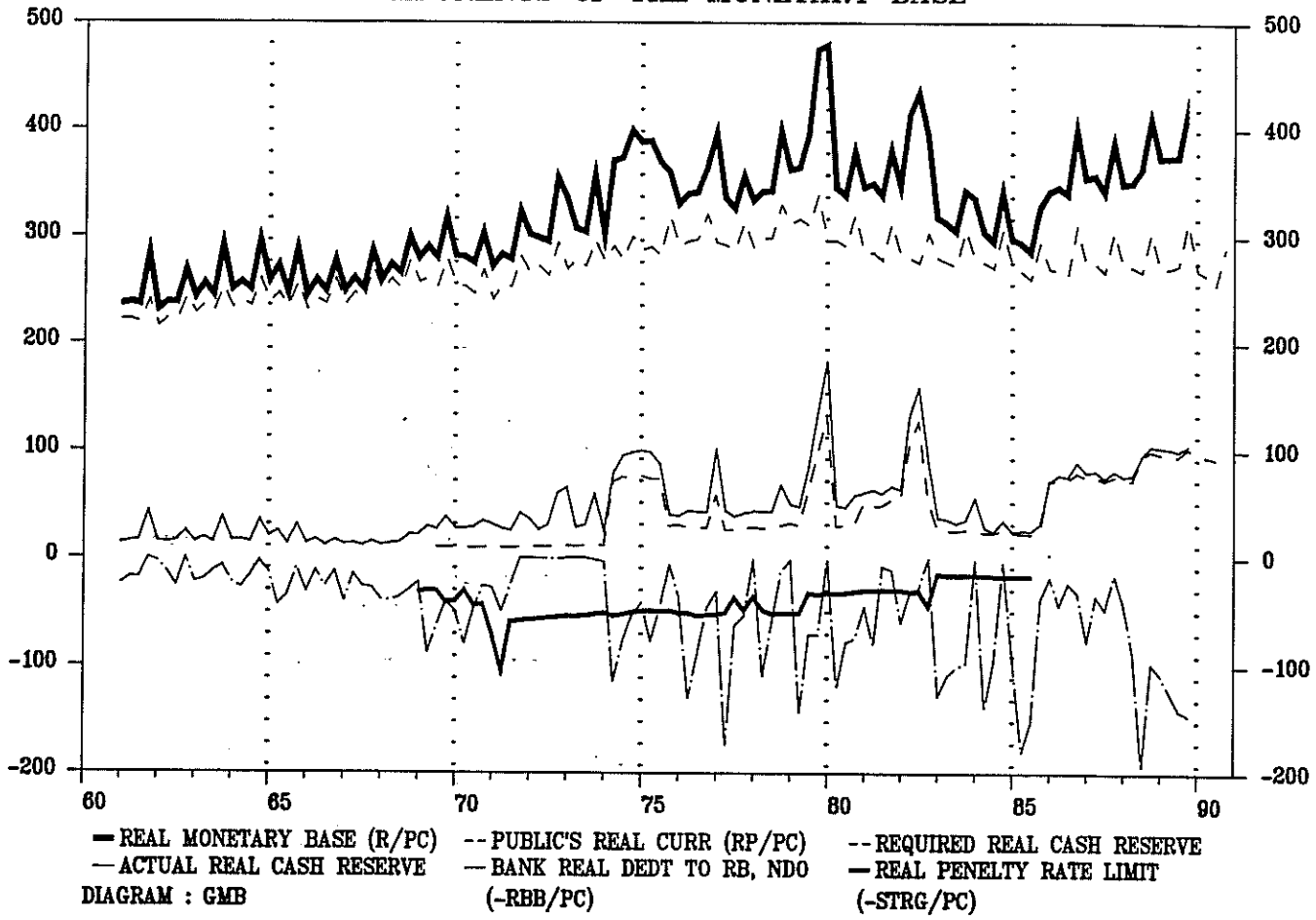


DIAGRAM : GMB

DIAGRAM 6:2

NOMINAL INTEREST RATES

END OF QUARTER

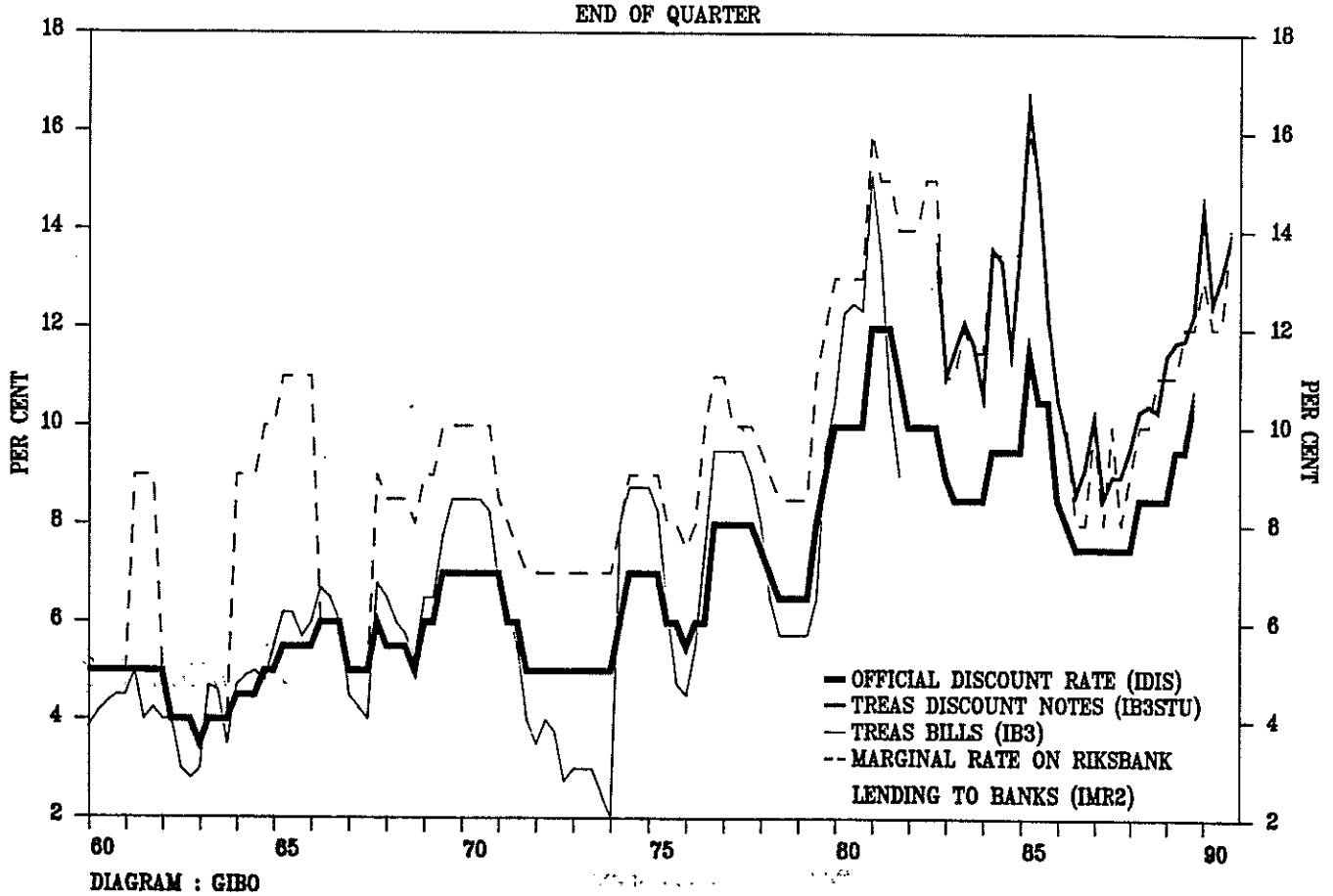


DIAGRAM : GIBO

DIAGRAM 6:3 MONETARY BASE AND ADJUSTED MONETARY BASE

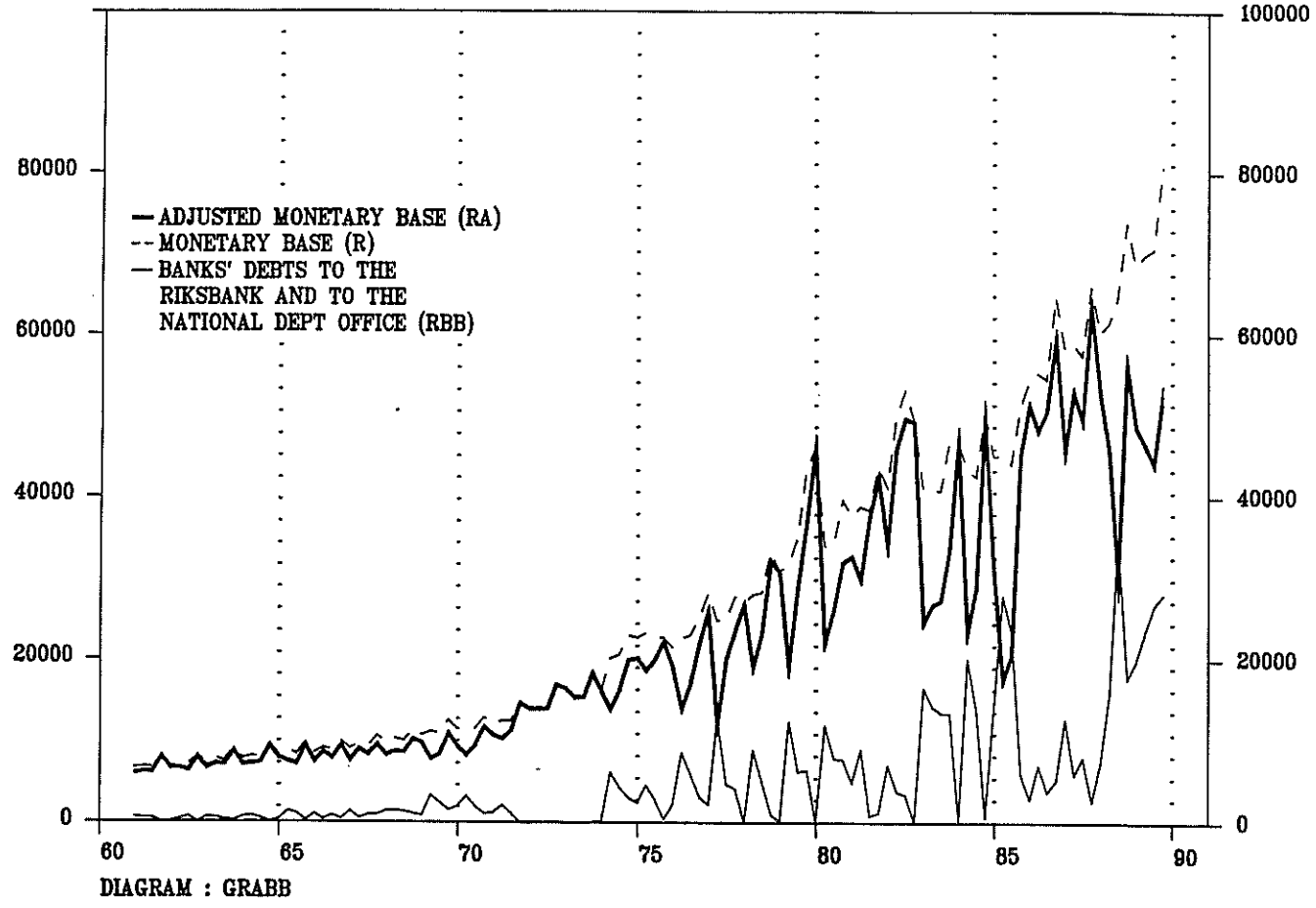


DIAGRAM 6:4 REQUIRED AND ACTUAL LIQUIDITY RATIO EQUIVALENT

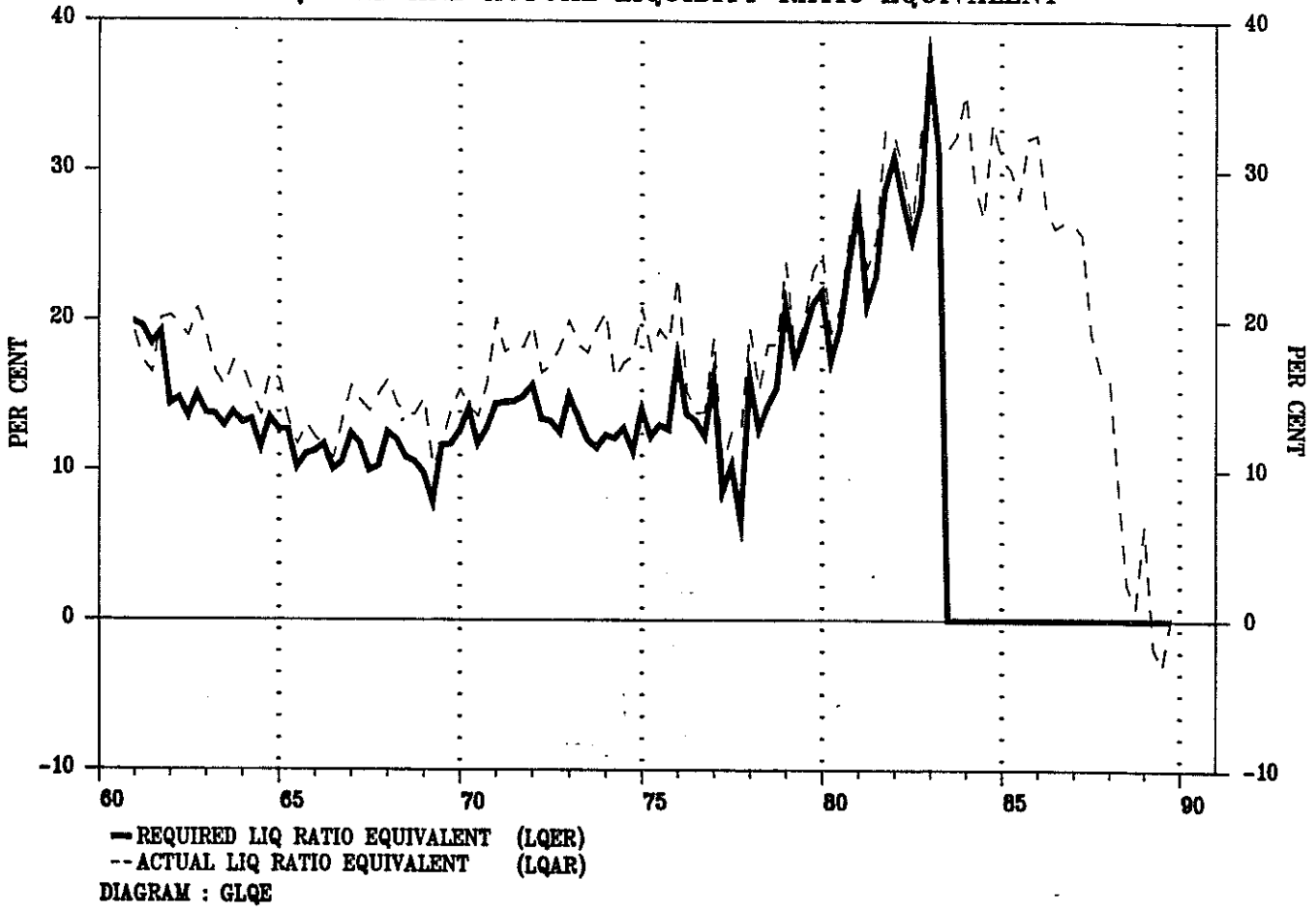


Table 5.1 Financial intermediaries. Loans (incl leasing) to the public. 1961-1989.
Per cent.

Intermediary/Year	61	65	70	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Banks	66	64	54	49	49	49	49	49	48	47	47	46	45	42	40	41	44	46
- foreign currency	.	.	.	1	2	3	3	4	5	8	10	11	12	11	10	10	13	17
Finance companies	.	.	2	3	3	3	3	4	6	5	6	7	7	7	8	9	8	8
- foreign currency	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1
Housing credit instit	17	22	31	34	34	33	34	33	33	34	33	33	34	36	38	39	38	37
Business credit institutions	3	3	5	6	6	7	7	7	6	7	7	8	8	8	7	6	6	5
- foreign currency	.	.	.	.	.	.	.	.	0	1	2	2	2	2	2	2	1	2
Local government credit institutions	.	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2
Insurance co	13	9	7	6	6	6	6	6	7	6	6	6	5	5	4	4	3	2
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
- foreign currency	.	.	.	1	2	3	3	4	6	9	12	13	14	13	11	12	14	20

Sources: Sveriges Riksbank, Statistical Yearbook, and SCB, SM K 1984:5, K12 SM 9002 and Kredit/Kapitalmarknaden